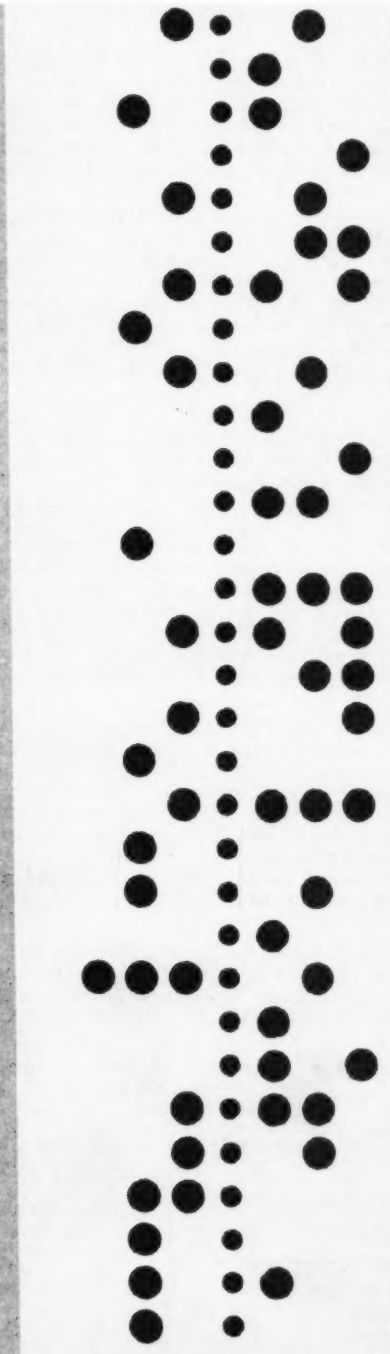
December 5, 1965

U.S. GOVERNMENT

# RESEARCH & DEVELOPMENT REPORTS



*A Semi-monthly Abstract Journal for Science and Industry*

CLEARINGHOUSE
FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION

U. S. DEPARTMENT OF COMMERCE / NATIONAL BUREAU OF STANDARDS / INSTITUTE FOR APPLIED TECHNOLOGY

*December 5, 1965 / Volume 40, Number 23*

*U.S. Government*

# RESEARCH AND DEVELOPMENT REPORTS

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## PURPOSE

*U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS* is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability of new reports of U.S. Government-sponsored R&D released by the Department of Defense and other Federal agencies. Included are reports from the Atomic Energy Commission and the National Aeronautics and Space Administration, which issue separate announcement journals as noted below.

## FORMAT

*USGRDR* contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by accession/report number under 22 major subject category headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes. Reports of current high industrial interest are featured in "Research Highlights."

## HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting accession/report numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject category headings; the various indexes will aid in locating those reports. A single reference guide to new Government-sponsored technical literature, *Government-Wide Index to Federal Research and Development Reports*, is compiled monthly by the Clearinghouse from the combined indexes of this journal, *Nuclear Science Abstracts* (AEC), *Scientific and Technical Aerospace Reports* (NASA), and *Technical Abstract Bulletin* (DDC). This combined index is available from Superintendent of Documents, U.S. Government Printing Office, annual subscription $16, ($4.00 for foreign mailing) or $1.75 single copy.

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SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $33.00 a year domestic, $42.00 foreign, $2.50 single copy plus 25 cents foreign mailing.

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Contents may be printed freely. Mention of source will be appreciated.
Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

# special
## ANNOUNCEMENTS

### NEW PATENT SUBSCRIPTION SERVICE

All new U. S. Patents announced in the Official Gazette will be available from the Clearinghouse on 16mm microfilm beginning in January 1966. The new service will be by subscription only. Individual patents will not be available on film.

The subscription price is $830 a year ($850 foreign; $920 foreign air mail). The estimated 67,000 patents announced annually will be distributed to subscribers in 100-foot reels of 16mm film -- three reels or 1,260 patents each week. These same patents ordered in hard copy form from the U. S. Patent Office would cost $33,500 annually. The new service also makes it possible for subscribers to save an estimated $2,000 a year in binding and storage costs. Patents issued in excess of 67,000 will be billed to subscribers at the rate of $5.25 per 100 foot reel (420 patents).

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## USGRDR GOES TO AUTOMATIC PHOTOCOMPOSITION

Another phase of our continuing program to improve the appearance and utility of the USGRDR is underway. The white section (Technical Abstract Bulletin) is now prepared on computer-actuated photocomposition equipment.

The blue section (Other Research Reports and Related Material) will be included shortly in this new system of photocomposition to produce a journal of uniform printing format.

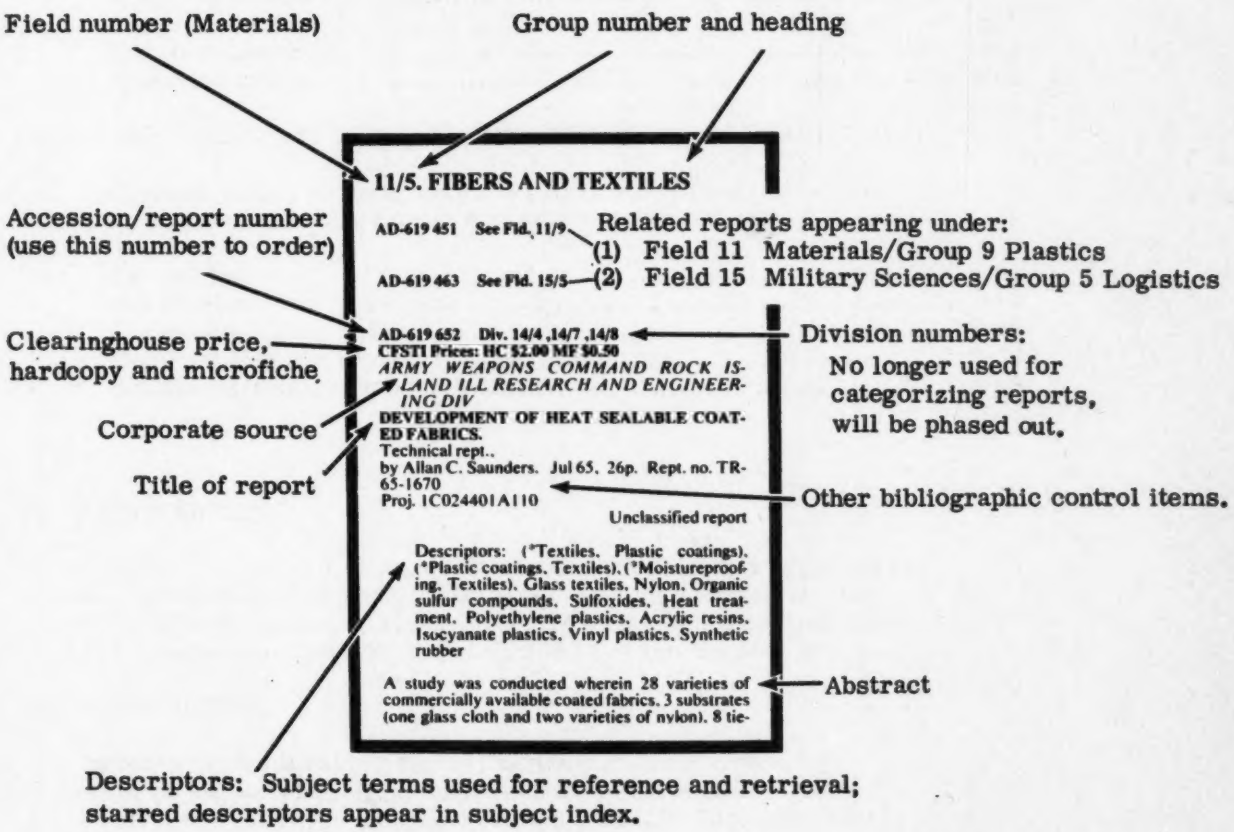
Automatic photocomposition of the USGRDR starts with the document records (indexing data and abstracts) prepared on punched paper tape at the Clearinghouse. This tape is then put through a series of computer conversion processes for insertion into automatic photocomposition equipment at the U. S. Government Printing Office. From the final computer input the photocomposition equipment produces page length columns with justified margins. These columns are then assembled into complete journal pages for photo-offset printing.

Advantages of the new format are the contrasting type faces and greater compactness, making the entries easier to scan. Perhaps of more intrinsic value is the new computer-directed cross-reference system that refers the reader to related reports announced under other Fields and Groups, some of which may at first appear to be remote from the reader's primary field of interest. Thus in the sample entry on the opposite page, the reader interested in Fibers and Textiles--Group 5 under Field 11 (Materials)--is referred not only to an applicable report in Group 9 under the same Field, but also to a related report in Field 15/Group 5, (Military Sciences/Logistics).

As in all projects involving new equipment and procedures it is inevitable that some errors will occur. These will be eliminated in future issues.

The indexes to both sections of the journal will continue to be processed in the conventional manner without automatic photocomposition.

## A DIAGRAMMED ENTRY


Field number (Materials)
Group number and heading
11/5. FIBERS AND TEXTILES
Accession/report number (use this number to order)
AD-619 451 See Fld. 11/9
AD-619 463 See Fld. 15/5
Related reports appearing under:
(1) Field 11 Materials/Group 9 Plastics
(2) Field 15 Military Sciences/Group 5 Logistics
AD-619 652 Div. 14/4 ,14/7 ,14/8
Division numbers:
No longer used for categorizing reports, will be phased out.
Clearinghouse price, hardcopy and microfiche
CFSTI Prices: HC $2.00 MF $0.50
ARMY WEAPONS COMMAND ROCK ISLAND ILL RESEARCH AND ENGINEERING DIV
Corporate source
DEVELOPMENT OF HEAT SEALABLE COATED FABRICS.
Technical rept..
Title of report
by Allan C. Saunders. Jul 65, 26p. Rept. no. TR-65-1670
Proj. 1C024401A110
Other bibliographic control items.
Unclassified report
Descriptors: (*Textiles, Plastic coatings), (*Plastic coatings, Textiles), (*Moistureproofing, Textiles), Glass textiles, Nylon, Organic sulfur compounds, Sulfoxides, Heat treatment, Polyethylene plastics, Acrylic resins, Isocyanate plastics, Vinyl plastics, Synthetic rubber
A study was conducted wherein 28 varieties of commercially available coated fabrics, 3 substrates (one glass cloth and two varieties of nylon), 8 tie-
Abstract
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02 AGRICULTURE

Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry. See also related field: 06 Biological and Medical Sciences..... No Entries

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Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects. See also related fields: 02 Agriculture, 05 Behavioral and Social Sciences, and 07 Chemistry..... 19, S-10

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Includes fusion devices (thermonuclear); isotopes; nuclear explosions; nuclear instrumentation; nuclear power plants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology. See also related fields: 07 Chemistry, 15 Military Sciences, 18 Nuclear Science and Technology, 20 Physics, and 21 Propulsion and Fuels..... 74, S-47

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# RESEARCH highlights

*Reports of current high industrial interest*

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## Biological and Medical Sciences

### RARE GASES SUPPRESS ACTIVITY OF ENZYME TYROSINASE

(Order AD-615 814 Technical Report: The Physiological Effects of Argon, Helium and the Rare Gases, HC $3.00/MF $0.75.)

Activity of the enzyme tyrosinase is significantly suppressed by argon, helium, and the other rare gases. Union Carbide, who made this discovery in a study for the Office of Naval Research, says this inhibition of an enzyme "constitutes a finding of great potential importance to physiologists who are concerned with future manned diving in the oceans." According to Union Carbide, their findings on the physiologic effects of helium, neon, argon, krypton, xenon, and of several other usually inert gases (such as nitrogen) lend strength to their "growing conviction that chemically inert gases are endowed with molecular properties which enable them to affect biological processes in a systematic and, most likely, universal manner."

Initial studies on tyrosinase led to the discovery that all gases examined inhibit the activity of this enzyme which catalyzes the oxidation of tyrosine by molecular oxygen. Tests were made at an equivalent depth of 980 feet of seawater (30.6 atm). Among the gases, helium produces the least inhibition — 16 percent — but this is still significant. Union Carbide observes that the severity of this inert gas effect increases with increasing capability of the gas molecules to enter into physical interactions with their molecular environment. At a partial pressure of 30.6 atm, they noted the following degrees of inhibition: neon 30%, argon 32%, nitrogen 40%, and nitrous oxide 50%. Studies with nitrous oxide showed that at least for this gas the inhibition is reversible either by return of the enzyme system to air at one atm or by increasing the partial pressure of oxygen from 0.2 to 5.3 atm.

### CENTRAL NERVOUS SYSTEM ANALYZED BY COMPUTER METHODS

(Order N65-28750-77 Symposium on the Analysis of Central Nervous System and Cardiovascular Data Using Computer Methods, HC $4.50/MF $2.50.)

A total of 27 papers on computer methods for the analysis of the central nervous system and cardiovascular data presented at a 1964 symposium held in Washington, D. C., have been brought together in a NASA publication. Among the papers are: Data Processing of Psychophysiological Recordings; Automated Analysis of Heart-Rate Patterns for Biomedical Monitoring; Considerations in Use of Information Processing Technology in Clinical Investigations; and Computer Analysis of the Effects of Bedrest on Cardiac Dynamics.

### ANTIBODY PRODUCTION STUDIED AS CLONAL PHENOMENON

(Order AD-621 543 Focal Antibody Production by Transferred Spleen Cells in Irradiated Mice, HC $1.00/MF $0.50.)

The study of antibody production in vivo as a clonal phenomenon has been undertaken at the Navy Radiological Defense Laboratory, San Francisco, using a new experimental approach. Drs. J. H. L. Playfair, B. W. Papermaster, and L. J. Cole injected normal nonimmunized lymphoid spleen cells from a normal syngeneic mouse into lethally irradiated mice which were then immunized against sheep and pig erythrocytes. In 20 irradiated mice, hemolysin activity against both the sheep and pig cells was detectable, but in different, nonoverlapping areas on the same spleen. From this the pathologists conclude that single precursor cells are responsible for the areas of antibody, and that the progeny of each of these precursor cells is restricted to forming a single antibody.

## Engineering and Construction

### ASPHALTIC CONCRETE IMPROVED BY ASBESTOS FIBERS

(Order AD-620 955 Laboratory Studies of Asphaltic Concretes Containing Asbestos Fibers, Rubberized Asphalt and Epoxy-Resin Asphalt, HC $2.00/MF $0.50.)

Fine asbestos fibers can improve the properties of asphaltic concrete, according to the U.S. Bureau of Reclamation. They say that asphaltic concrete fortified with fine asbestos fibers (wast screenings) can be used advantageously for linings and dam facings and in other hydraulic engineering projects. The fibers give increased compressive and tensile strength, stability, and erosion resistance properties to the concrete and make a highly durable material capable of withstanding the major stresses that develop during service, particularly in dams. Bureau of Reclamation engineers also say the asbestos fibers permit an increase in the asphalt cement content by 0.5 to 1.0 percent, without sacrificing density or stability. This should add to the durability. For laboratory standard density specimens, compressive strengths at room temperature (ranging from 720 to 970 psi for air cured and 710 to

740 for water cured) and at 140°F (ranging from 320 to 350 psi) were about twice that of the standard asphaltic concrete specimens. Tensile strengths ranging from 210 to 230 psi were about 1-1/2 times that of the standard asphaltic concrete. Stability and erosion resistance were similarly improved. One disadvantage noted for hydraulic construction is that asbestos fibers tend to bulk the mix, resulting in increased voids and a less watertight material. However, by using the cheaper, finer fibers (wast screenings) a watertight material can be obtained.

## Lubricants

### POWDER LUBRICATION AND DELIVERY TECHNIQUES ADVANCED

(Order AD-464 626 Development of Gas-Entrained Powder Lubricants for High Speed and High Temperature Operation of Spur Gears, HC $4.00.)

Bearings and spur gears have been designed and a powder lubricant has been developed for high speed, high temperature operation. Fairchild Hiller Corp., in a 4-1/2 year study for the Air Force, made gears that operated successfully for 100 hours at speeds to 7400 rpm and with loads to 1000 ppi of tooth face. Temperatures ran from ambient to 900°F. The powder lubricant was a mixture of 5 parts of micronized Acheson No. 38 graphite to 1 part cadmium oxide. Gears were made of M-50 tool steel and consisted of a 16-tooth and 15-tooth unit of 5 diametral pitch. The researchers say this work significantly advances the state-of-the-art of powder mixture and powder delivery techniques.

### TESTS SHOW BEST OIL MIST VELOCITIES FOR BEARING ROTATIVE SPEEDS

(Order N65-27392 Effect of Speed, Load, and Temperature on Minimum Oil Flow Requirements of 30 and 75 Millimeter-Bore Ball Bearings, HC $1.00/MF $0.50.)

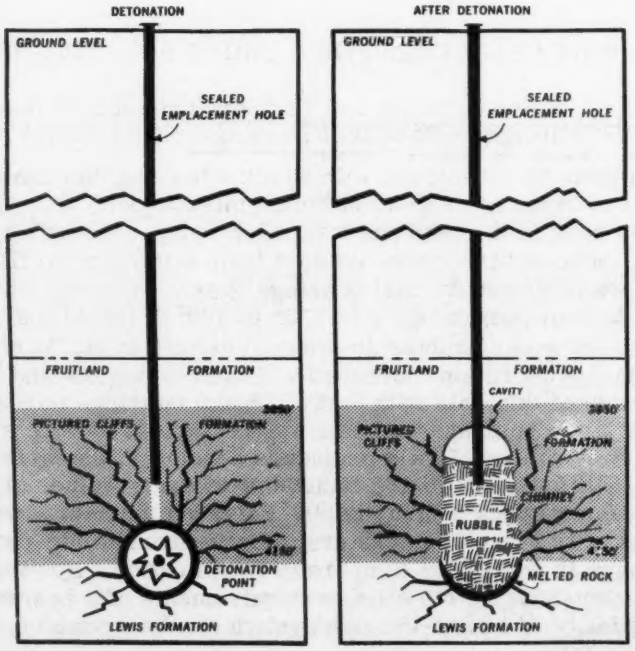
Airflow apparently affects the efficiency with which a bearing can use the oil droplets fed to it, and there appears to be an optimum mist velocity for a given DN range (product of bearing bore in mm and shaft speed in rpm). According to the Lewis Research Center, these observations resulted from minimum oil flow tests conducted with 30 mm bore deep-groove ball bearings over a DN range of $0.825 \times 10^6$ to $0.975 \times 10^6$. The temperature range was 170° to 400°F, thrust load was 265 pounds, and the lubricant was a naphthenic mineral oil-air mist. Minimum required oil flow for continuous operation increased with increasing DN and bearing temperature. A correlation of this data with that of 75 mm bearings indicates that minimum required oil flow can be expressed as a single function of bore size, load, DN figure, and bearing temperature. Lewis engineers developed the correlation for 30 and 75 mm bearings at thrust loads of 265 to 3000 pounds, DN values of $0.6 \times 10^6$ to $0.975 \times 10^6$, and temperatures of 225° to 500°F. Since thermal and oxidative degradation are functions of time and temperature, a once-through lubrication system may be of advantage in some high temperature application. However, when economy is of paramount importance, the oil flow requirements of a bearing must be known before the feasibility of a once-through system can be evaluated.

## Fuels

### NUCLEAR BLASTING MAY INCREASE NATURAL GAS OUTPUT

(Order PNE-1000 Project Gasbuggy, HC $1.00.)

Production rates and producible reserves of natural gas might be greatly increased through the use of underground nuclear blasts, thereby providing the means by which present natural gas resources of the United States would be effectively exploited. This is the gist of a report submitted to the AEC by the U.S. Bureau of Mines, the Lawrence Radiation Laboratory, and the El Paso Natural Gas Company. Engineers from these organizations report (1) a network of fractures radiating out from the shot point would result, permitting more effective drainage of the gas reservoir in formations of low permeability; (2) an expanded wellbore would result, allowing higher sustained rates of production after initial drainage of the fracture zone; and (3) an effective storage volume would accumulate for short-term high deliverability of natural gas. Because of the magnitude of the benefits that might be obtained at a reasonable cost, engineers of both the Bureau of Mines and the El Paso Natural Gas Co. have called on the AEC to carry out an experiment to test the feasibility of the concept of nuclear stimulation of gas wells in one of the remote areas of the Southwest. The gas produced from such a well probably would contain some gaseous radioactive material, but it is possible the contamination would be slight and could be readily reduced to acceptable limits by dilution with field gas. It is also possible the well could be flushed of most of its gaseous contaminates by flaring off a small portion of the natural gas.



## Metals, Non-Ferrous and Alloys

### WIDER USE FOR MAGNESIUM-LITHIUM ALLOYS

(Order N65-29952 Technical and Economic Status of Magnesium-Lithium Alloys, HC $0.25/MF $0.50.)

Developed as early as 1944 but left unused for many years, magnesium-lithium alloys are now being applied to a variety of hardware, the Battelle Memorial Institute reports in a NASA-sponsored project. For example, the Lockheed Missiles and Space Co. finds the alloys very useful in electronic packaging, mounting segments, mounting clips for microwave guides, spun air-conditioning duct work, pressure and dust panels, antenna-mounting structures, gyro mounts, brackets for electronic connections, and heat shields. Battelle indicates that the alloys are considerably less expensive than beryllium with respect to both material and fabrication costs, but that they are more expensive than commercial magnesium alloys. Therefore, while it is being demonstrated that the alloys are technically and economically sound for space applications, it is not clear what their usefulness might be for commercial products in which cost is a major factor. The alloys are characterized by lightness and good formability and are amenable to alloying with many other metals. With relatively small amounts of alloying elements, their strength is improved over that of the binary alloys and it can be maintained at modest levels for an indefinite time at 150 to 200°F.

## Nuclear Technology

### VALUABLE WORK PRODUCED ON REACTOR CONTAINMENT

(Order ORNL-NSIC-5 U.S. Reactor Technology, Vols. I and II, HC $14.00 a set.)

A two-volume work on U.S. reactor containment technology — the first of its kind on a relatively new subject and one upon which there is considerable research and development — has been prepared by Oak Ridge National Laboratory and Bechtel Corporation. According to the Atomic Energy Commission, the publication is a significant contribution to nuclear reactor safety. It covers in detail one of the most important interests of ORNL's Nuclear Safety Information Center and it is a massive compilation of current practice in the analysis, design, construction, test, and operation of containment systems.

The work considers matters of significant interest to the containment designer and fabricator, and to the plant operator concerned with the containment system. It covers not only the design of the many existing containment systems but also how and why these designs were developed. It tells why particular containment systems appear more suitable in certain reactor systems for certain applications. In addition, it goes into the capabilities and limitations of the various containment systems and describes all credible accidents for which the containment is provided.

A credible accident, says the AEC-sponsored work, is one which, in the judgment of safety analysts, must be provided for in the design of the facility. In many cases very severe accidents may be thought of, but they may be incredible or could not occur. In general, no single credible accident could render substantial damage to the surrounding environment, but some combination or sequence of credible accidents may be postulated that would result in what is called the Maximum Credible Accident (mca). The mca is one that can cause the most serious consequences as far as radiation exposure to the surrounding off-site populace is concerned. There are limits beyond which these consequences cannot be allowed to extend. If for a given facility the consequences are beyond these limits, more effective containment measures must be assured if the facility is to be built and operated.

Containment was first attained in the early days of reactors by the use of large exclusion areas surrounding the reactor installations. The picture is now changed since location in remote areas is not compatible with today's need to provide electric power for our industrial complexes using nuclear reactors. This need implies location near heavily populated areas. In addition, the use of reactors in marine propulsion systems may also bring power reactors nearer to population centers. There is also an increasing desire and need to use reactors for experiments and research.

## Wood and Paper

### WESTERN WOOD DENSITY SURVEY

(Order AD-618 891 Western Wood Density Survey, Report Number 1, HC $3.00/MF $0.75.)

The U.S. Forest Products Laboratory has developed a new method for predicting the specific gravity in a standing tree. It successfully used the technique to determine average values for nine species in the preliminary phase of the western wood density survey. Forest industries will find the technique extremely useful in helping them evaluate the quality of the timber in a given stand of trees. Such things as age, terrain, precipitation, growth rate, and the sample's position on the tree affect the specific gravity, but the researchers were able to come up with average values for areas of the Far West. Values are given for seven firs — Douglas, white, black, Pacific silver, California red, grand, and noble — plus western hemlock, and western larch. The hemlock, larch, and Douglas fir show the highest average specific gravity values. Forest experts note that specific gravity is a useful indicator of the quality of lumber produced from a stand — particularly the relative strength of the boards for structural use.

# R & D REVIEWS

## Available FREE from the Clearinghouse

### HIGH TEMPERATURE PROTECTIVE COATINGS FOR MOLYBDENUM AND TUNGSTEN (OTR-131)

Critical requirements for refractory metals in the Nation's defense and space programs have given researchers the impetus to develop coatings that will overcome the primary problem in using these materials--the lack of oxidation resistance at high temperatures. Protective coatings are available which function properly under specific circumstances; however, to date, durable protective coatings for ultrahigh temperature are not available. Government-sponsored efforts in this direction are noteworthy because they have contributed to an advance in coating quality and performance, an increased understanding of the behavior of coated systems, and a more complete realization of the problems associated with the use of coated hardware. A review prepared for the NBS Institute for Applied Technology describes Government work on coatings for both molybdenum and tungsten. In one program, for example, researchers obtained tensile and creep-rupture properties for disilicide-coated unalloyed molybdenum sheet at 2800, 3000, and 3200°F. In another study, three coating systems were developed that offer some protection to 60-mil tungsten in air at elevated temperatures. Another program identified four processes that have been scaled up to coat components of aerospace vehicles: (1) slurry, (2) atmospheric-pressure pack cementation, (3) vacuum pack cementation, and (4) fluidized bed. Each process is evaluated for its principal advantages and disadvantages.

### HIGH TEMPERATURE ADHESIVES ABOVE 500°F (OTR-132)

Government defense and space programs have accelerated demands for improved thermal endurance of adhesives and improved mechanical and chemical performance of the bonded joint. To meet these demands, numerous programs have been launched to upgrade the performance of existing materials and to create new materials. A review prepared for the NBS Institute for Applied Technology describes recent significant advances that have been made in Government programs on surface preparation of substrates, ceramic and organic adhesives, bonding of laminates and other structures, and testing. Characterized by their ability to flow together when subjected to heat during the firing process, ceramics are being singled out for service above 500°F. Fused silica fiber reinforced laminates have been bonded by aluminum-phosphate type cements, for example, for service above 900°F. But organic adhesives are also undergoing considerable development. For example, one such adhesive was developed in a Navy project that has good tensile shear strength for 250 hours at 500°F on steel. It even displays strength after 1,000 hours.

## THIN FILM PROTECTIVE COATINGS (OTR-133)

Government-sponsored work on thin film protective coating technology has made significant contributions to present knowledge of oxide and chromate treatments, phosphate treatments, protection of metal couples, and organic protective coatings. Know-how has also been gained about electrodeposition of polytetrafluoroethylene, temporary metal coatings, resin-bonded lubricant coatings, and aluminum alloy protection. Among other things, these efforts have led to the development of films which, while affording a high degree of protection to metal, do not interfere with normal or dry-film lubrication. Studies have been conducted on protective black oxide coatings applied at low temperature. Thin surface coatings have been developed for use on ferrous and other metal surfaces. In eight-year exposure tests made at Rock Island Arsenal, zinc phosphate undercoats have been shown to be superior to their iron and manganese phosphate counterparts. The flow of sodium ions through films has helped in studying organic barrier films for corrosion control while exposed to salt water. Various newer types of protective films developed include oxide and other chemical conversion types, organic, organic electrodeposited, and painted films. A review prepared for the NBS Institute for Applied Technology describes many recent Government programs in this field and the reports that are available from the Clearinghouse.

## OTHER TITLES IN THIS SERIES

OTR–101 Hot Machining
OTR–102 Nickel-Titanium Alloys
OTR–103 Photochromism and Phototropism
OTR–104 Fire-Extinguishing Material Technology
OTR–105 Flame-Retardant Textiles
OTR–106 Humidity-Controlled Warehousing
OTR–107 Concrete Technology
OTR–108 Volatile Corrosion Inhibitors
OTR–109 Grease Lubrication
OTR–110 Thermoelectric Materials & Fabrication
OTR–111 Integrated Circuitry
OTR–112 Fluid Amplification
OTR–113 Ultrasonic Fabrication
OTR–114 Ultrasonic Testing
OTR–115 High Energy Metal Forming
OTR–116 Numerical Controls
OTR–117 Dielectric Films in Microelectronics
OTR–118 Fiber Optics
OTR–119 Honeycomb and Sandwich Materials
OTR–120 Microminiature Circuit Packaging Techniques
OTR–121 Foam Technology and Application
OTR–122 Dispersion-Hardened Metals & Alloys
OTR–123 Solid Film Lubrication
OTR–124 Nondestructive Evaluation of Materials
OTR–125 Microminiaturization of Circuit Components
OTR–126 Organic Semiconductors
OTR–127 Fiber-Reinforced Metals and Alloys
OTR–128 Plastic Coatings
OTR–129 Brazing Technology and Application
OTR–130 High Temperature, Fire-Resistant Hydraulic Fluids

# TECHNICAL ABSTRACT BULLETIN

## 1/2. AERONAUTICS

**AD-622 404 Div. 1/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY AVIATION MATERIEL LABS FORT EUSTIS VA*
**ANALYTIC STUDY OF AIRCRAFT AGILITY IN THE TURNAROUND MANEUVER.**
Research technical memo.,
by Clifton G. Wrestler,Jr.. Sep 65, 26p. Rept. no. RTM-38 ,USAAVLABS-TR-65-67
Task 1P121401A14184

Unclassified report

Descriptors: (*Army aircraft, Maneuverability), (*Maneuverability, Army aircraft), Flight, Flight speeds, Deceleration, Time, Flight testing, Loading (Mechanics), Acceleration, Helicopters, Flight paths, Numerical analysis, Performance (Engineering), Aerial warfare

Calculations of the minimum distance and time required for an aircraft to return to a point without changes in altitude are presented for the initial velocities of 50, 100, 150, and 200 knots. The aircraft was allowed to decelerate at various predetermined values while maintaining a constant normal load factor. When the minimum distance was determined, the time corresponding to minimum distance was examined to see if it was close to the minimum time computed. No allowance was made for pilot or aircraft response time, and the physical limitations of the aircraft were not explored. (Author)

**AD-622 578 Div. 1/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*LOCKHEED-CALIFORNIA CO BURBANK*
**STUDY OF SIZE EFFECTS ON VTOL' HANDLING QUALITIES CRITERIA,**
by J. Ford Johnston, Irven H. Culver, and Carl F. Friend. Sep 65, 97p. Rept. no. LR-18408
Contract DA44 177AMC236T Task 1P121401A14178
USAAVLABS , TR-65-24

Unclassified report

Descriptors: (*Vertical take-off planes, Control), Design, Dynamics, Flight, Jet planes, Helicopters, Yaw, Pitch (Motion), Roll, Stability, Hovering, Human engineering, Damping

A fundamental study is presented of the effects of vehicle size on handling qualities of jet and helicopter-type VTOL aircraft at hover and low speeds, size being defined by the characteristic linear dimension. The effects of size on vehicle handling qualities capability and pilot-vehicle compatibility are developed. Consideration is given to the pilot as an adaptive nonlinear servo. The study indicates: (1) Control power/inertia and damping/inertia tend to decrease with size. (2) Except for tail rotor helicopters in yaw, final angular rates are relatively invariant with size. (3) Characteristic time to reach final angular rate increases with size. (4) Linear accelerations and motions are nearly invariant with size. (5) Effects of external disturbances and trim changes with speed on jet VTOL vehicles decrease at least as rapidly as control power/ inertia. (Author)

**AD-622 861 Div. 1/4 ,2/7**
**CFSTI Prices: HC $2.00 MF $0.50**
*TRAVELERS RESEARCH CENTER INC HARTFORD CONN*
**RADAR FORECASTING OF VISIBILITY RESTRICTIONS IN SNOW.**
Interim rept.,
by James W. Wilson. Sep 65, 30p. Rept. no. 7468-172
Contract FA65WA1192 Proj. 150 535 02A
SRDS , RD-65-74

Unclassified report

Descriptors: (*All-weather aviation, Meteorological radar), (*Weather forecasting, All-weather aviation), (*Meteorological radar, All-weather aviation), Snow, Runways, Visibility, Radar scanning, Radar echo areas, Atmospheric precipitation, Correlation techniques, Civil aviation

Quantitative echo-intensity data from two snowstorms, collected with the WSR-57 at Washington, D. C., are compared with visual-range data from 7 transmissometers located within 45 miles of the radar. In general, a high correlation exists between average radar received power and runway visual range: the coefficient of correlation exceeds 0.82 for stations within 35 miles of the radar during periods of significant changes in visual range. The relationship between visual range (V) and average radar-received power (P sub r) is of the form log V = AP sub r - B, where A and B are constants. 10- to 70minute forecasts of visual range are obtained by extrapolating the radar echo pattern and converting the resulting echo intensities, by the above relationship, to visual range. Comparison of radar and persistence forecasts of visual range indicates that the radar forecasts are generally superior. Although further tests are required before weather radar can be recommended for operational use in visual-rarige forecasting, the possibilities look promising. (Author)

**AD-622 863 Div. 1/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER ATLANTIC CITY N J EXPERIMENTATION DIV*
**ALTITUDE CORRESPONDENCE TESTS WITH DELTA AIRLINES DC 8 (FRAME 807).**
Technical rept.,
by Felix Hierbaum,Jr.. Jul 65, 11p. Rept. no. RD-65-93
Proj. 242 006 03X

Unclassified report

Descriptors: (*Altimeters, Tests), (*Air traffic control systems, Flight testing), Civil aviation, Recording systems, Radar beacons, Transponders, Aircraft equipment

A Delta Airlines DC8 (airframe number 807), with automatic altitude reporting equipment installed, was operated in the New York ATC area for a short period of time. During this time, personnel of the Experimentation Division at the National Aviation Facilities Experimental Center (NAFEC) monitored the outbound flights from Newark, New Jersey, to Atlanta, Georgia. The reported data show that the pilot-reported altitude and the NAFEC-observed altitude correspond to each other within 100 feet or less. Altitude readouts were not received during some phases of climb out of Newark, and antenna shielding was suspect. On occasions when the pilot was utilizing other altimeter settings on climb, there was a correspondence difference that was expected. But, in cruise condition and with altimeter settings of 29. 92 except for Flight 4, no deviation occurred. (Author)

**AD-622 866 Div. 1/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*TECHNOLOGY INC DAYTON OHIO*
**FLIGHT TECHNICAL ERROR OF GENERAL AVIATION AIRCRAFT.**
Final rept.,
by W. Wallace Morton,Jr., Cyril G. Peckham, and Joseph F. Braun,Jr.. Jun 65, 43p. Contract FA WA4542 Proj. 320 205 01R
SRDS , RD-65-60

Unclassified report

Descriptors: (*Flight paths, Errors), Civil aviation, Statistical analysis

This report presents a study of the Flight Technical Error (random deviations from intended cruise altitudes) of six general aviation aircraft. Based in Ohio, Indiana, and New Jersey, these aircraft were a Beech C-45, a Bonanza H-35, an Apache PA-23-160, a Navion Rangemaster, a Cessna Skylane, and a Comanche PA-24-180. A total of 626 hours of cruise data was collected. A statistical analysis of the results is presented. (Author)

**AD-622 615 See Fld. 1/3**

## 1/3. AIRCRAFT

**AD-622 400 Div. 1/2 ,1/3**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**THE EXTERNAL LOADS AND STRENGTH OF FLYING APPARATUSES,**
by A. I. Gudkov, P. S. Leshakov, and L. G. Ryakov. 20 Jul 65, 632p. Rept. no. FTD-MT-64-526 TT , 65-64167

Unclassified report

Edited machine trans. of mono. Vneshnie Nagruzki i Prochnost Letatelnykh Appartov, Moscow, 1963, 480p. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Aeroelasticity, Aircraft), (*Aircraft, Aeroelasticity), (*Helicopters, Aeroelasticity), Aerodynamic heating, Aerodynamic loading, Fatigue (Mechanics), USSR

This book is dedicated to external loads having effect on a flight vehicle (aircraft and helicopter), and the durability of its construction. Basic attention in the book is allotted to actual problems of strength of contemporary flight vehicles: dynamic load, periods of service and strength of construction, strength during high speeds of flight, taking into account aerodynamic heating and others. Along with an account of theoretical questions in the book there are described experimental methods of investigating strength of construction. The book is designed for engineers connected with designing, tests, and exploitation of flight vehicles. At the same time, it can be used as a training aid for aviation students of higher educational institutions. (Author)

**AD-622 412 Div. 1/9**
**CFSTI Prices: HC $4.00 MF $0.75**
*SIKORSKY AIRCRAFT DIV UNITED AIRCRAFT CORP STRATFORD CONN*
**ANALYSIS AND CORRELATION OF HELICOPTER ROTOR BLADE RESPONSE IN A VARIABLE INFLOW ENVIRONMENT.**
Final rept. for Jun 63-Mar 65,
by Raymond G. Carlson, and Kurt D. Hilzinger.
Sep 65, 126p. Rept. no. SER-50405
Contract DA44 177AMC87t Task DA 1D121401A142
USAAVLABS , TR-65-51

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Helicopter rotors, Rotor blades (Rotary wings)), (*Rotor blades (Rotary wings), Aerodynamic characteristics), Aeroelasticity, Aerodynamic loading, Shear stresses, Moments, Helicopters, Correlation techniques, Damping, Structural properties, Frequency

The program was conducted to determine the ability to predict Helicopter rotor response with a combined analysis based on the Sikorsky aeroelastic analysis and the Cornell Aeronautical Laboratory variable inflow analysis. The Sikorsky analysis is a fully coupled flatwise-edgewisetorsional dynamic analysis modified to incorporate refinements in rotor trim and airload calculation and to adapt it for use with the variable inflow analysis. Analytical results were compared with available flight data for steady level flight of the H-34 at 41, 70, and 112 knots with a neutral center of gravity (C. G.), and 73 knots with aft C. G., as well as the HU-1A at 113 knots with neutral C. G. Fairly good correlation with test data was obtained. The analysis gave better correlation of blade air loads and bending moments than had been obtained from constant inflow analysis. In particular, more realistic values were obtained for the higher harmonic root-shear forces needed to define airframe response. While further improvement can be obtained by refinement of the variable inflow analysis, the combined analysis developed for the program provides an improved design tool for rotor blade evaluation. (Author)

**AD-622 454 Div. 1/7 ,33/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**THE SILVERY CIGARS (DIRIGIBLES) ARE BEING PREPARED FOR OPERATION,**
by Yu Dmitriev. 12 Oct 65, 15p. Rept. no. FTD-TT-65-744
TT , 65-64179

Unclassified report

Unedited rough draft trans. of Nauchno-Tekhnicheskie Obshchestva SSSR, v7 n4 p43-5 1965.

Descriptors: (*Air ships, USSR), Air transportation

**AD-622 585 Div. 1/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS*
**RESEARCH IN AIRCRAFT STRUCTURES ANALYSIS AND DESIGN.**
Final rept. for 5 Nov 63-2 Feb 65,
by Wilfred H. Horton, and Jean Mayers. Sep 65, 35p. Contract DA44 177AMC115T Proj. 1P121401A14176
USAAVLABS , TR-65-61

Unclassified report

Descriptors: (*Airframes, Structural parts), Design, Structural shells, Cylindrical bodies, Metal plates, Sandwich panels, Beams (Structural), Sandwich construction, Buckling (Mechanics), Structures, Mathematical analysis, Theory, Stability, Vibration, Stresses, Loading (Mechanics)

The paper outlines new approaches to the experimental study of the instability of shell bodies and provides fresh analyses in this field. It abstracts from recent extensions to the maximum strength analysis for flat plates and gives an outline of a generalization in the theory of buckling of sandwich plates. It refers to research efforts on the stability of conical shells and indicates progress in studies of the influence of higher order linear and nonlinear effects on the lateral vibrations of solid and sandwich beams. (Author)

**AD-622 586 Div. 1/9**
**CFSTI Prices: HC $4.00 MF $1.00**
*BOEING CO MORTON PA VERTOL DIV*
**TRANSMISSION STUDY FOR TANDEM-ROTOR SHAFT-DRIVEN HEAVY-LIFT HELICOPTERS.**
Final rept. for 27 Jun-27 Dec 64,
by John Mack. Sep 65, 148p. Rept. no. R-379
Contract DA44 177AMC241T Proj. 1M121401D14414
USAAVLABS , TR-65-56

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Helicopter rotors, Transmissions), (*Transmissions, Helicopters), Shafts, Helicopter engines, Drives, Bearings, Titanium, Tensile properties, Fatigue (Mechanics), Reduction gears, Control systems

Mechanical drive systems for heavy-lift tandem-rotor helicopters were studied. Three- and four-engine configurations were analyzed. Configurations included aft-mounted and fore- and aft-mounted engines, single and dual drive systems, and high-mounted and low-mounted aft planetaries. Weights were estimated. Problems of gear surface durability, multiengine control, and over-running clutches were defined. The effects of increased gear tooth bending fatigue strength, higher bearing capacity, supercriticalspeed shafting, and the use of titanium and improved ferrous metals were evaluated. In the more significant factors, the satisfactory solution of the heavy-lift helicopter drive system lies within the current state-of-the-art. (Author)

**AD-622 615 Div. 1/9 ,1/4**
**CFSTI Prices: HC $4.00 MF $1.00**
*CORNELL AERONAUTICAL LAB INC BUFFALO N Y*
**FLIGHT TEST DETERMINATION OF LATERAL STABILITY AND CONTROL DERIVATIVES FOR A SINGLE ROTOR HELICOPTER. PART I. EQUATIONS OF MOTION, ANALYSIS TECHNIQUES, INSTRUMENTATION, AND FLIGHT SHAKEDOWN,**
by W. R. Deazley, and E. R. Schultz. Aug 59, 132p. Rept. no. TB-1288-F-1
Contract AF33 616 6049 Proj. 1365 Task 13804
WADC , TR-59-754 P1

Unclassified report

Continuation of Contracts AF33 616 2773 and Contract AF33 616 5361. Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Helicopters, Stability), Control, Flight testing, Equations, Rotary wings, Instrumentation, Dynamics, Aerodynamic characteristics, Physical properties

The lateral equations of motion were derived for the single rotor helicopter considering three rigid-body degrees of freedom. Means are presented for estimating the various physical and aerodynamic characteristics of the XHO3S-2 helicopter. Sample calculations are made in which the stability derivatives are found for the 70 mph case. Methods are presented for etracting the primary lateral aerodynamic stability derivatives from helicopter flight test data. Both steady-state and transient flight test methods were considered. The contributions of the various terms in the equations of motion to the lateral responses of the helicopter were studied on an analog computer. Both lateral cyclic pitch and tail rotor collective pitch step inputs were used for exciting the various lateral modes of the helicopter. Certain new instrumentation was developed to measure the necessary lateral variables. A complex strain gage installation measures the resolved lateral shear and moments in the rotor shaft. (Author)

**AD-622 448 See Fld. 13/9**

**AD-622 635 See Fld. 5/1**

## 1/4. AIRCRAFT FLIGHT INSTRUMENTATION

**AD-622 804 Div. 1/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*RADIO CORP OF AMERICA CAMDEN N J*
**THE VALIDATION OF A MAINTAINABILITY PREDICTION TECHNIQUE FOR AN AIRBORNE ELECTRONIC SYSTEM.**
Final rept. for Jan-Sep 64,
by B. L. Retterer, G. H. Griswold, R. L. McLaughlin, and Donald A. Topmiller. May 65, 75p. Contract AF33 615 1338 Proj. 7184 Task 718406
AMRL , TR-65-42

Unclassified report

Descriptors: (*Identification systems, Airborne), (*Aircraft equipment, Maintainability), (*Electronic equipment, Airborne), Analysis, Test methods, Instruction manuals, Maintenance, Scheduling, Malfunctions, Maintenance personnel, Maintenance equipment, Human engineering

A technique for predicting the maintainability, at the field maintenance level, of airborne electronic equipment was investigated. In the technique, which was based on one previously developed for ground electronic systems, design features, skill requirements, facilities and the maintenance environment are used to predict maintenance times. Predictions of elemental task-times involved in maintaining the AN/APX-46 airborne IFF were computed from ratings made independently by Air Force and contractor (RCA) personnel. These predictions were compared with each other and with data collected under field conditions in which malfunctions were artificially introduced. The two independent predictions of overall down time were in close agreement with each other, however, there was little agreement between the elemental task-time predictions. Although the fieldcondition data were limited, the analyses suggest that the prediction equation would tend to overestimate actual times. On the basis of this study it cannot be concluded that the technique, as used, accurately predicts maintenance down-time of airborne electronic equipment. However, it appears that portions of the technique could be used to evaluate the relative maintainability of alternative designs. Suggestions for modifying the techniques and for improving the predictions are presented. (Author)

**AD-622 981 Div. 1/1 ,25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AERO-ELECTRONIC TECHNOLOGY DEPT*
**PHASE I REPORT, SOLID STATE RADAR ALTIMETER DEVELOPMENT,**
by W. F. McCarty. 13 Sep 65, 12p. Rept. no. NADC-AE-6510
Task R36100 000 202F001 98 02 ,IED EC6X002 13 02

Unclassified report

Descriptors: (*Altimeters, Radar equipment), (*Solid state physics, Altimeters), Feasibility studies, Varactor diodes, Semiconductor devices, Frequency multipliers, Microwaves, Microwave equipment, Radiofrequency power, Transistors, Oscillators

A study of the feasibility of generating microwave signals from solid state sources, and the analysis and design of varactor multipliers were undertaken as the first phase in the possible development of a solid state radar altimeter. The results showed that a solid state microwave generator is possible, and a completely solid state radar altimeter is feasible. (Author)

## 1/5. AIR FACILITIES

**AD-622 357 Div. 33/1**
**CFSTI Prices: HC $12.15 MF $3.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**SITING AND DESIGN OF AIRPORTS,**
by D. A. Mogilevskii, V. F. Babkov, A. S. Smirnov, L. T. Abramov, and F. Ya. Zaitsev. 1965, 912p. Rept. no. FTD-TT-65-99
TT , 65-64147

Unclassified report

Unedited rough draft trans. of mono. Izyskaniya i Proektirovanie Aerodromov, 2d ed., Moscow, 1963 704p. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Airports, Site selection), (*Landing fields, Design), Civil aviation, Aircraft landings, Takeoff, Runways, Taxiing, Landing aids, Buildings, Storage, Pavements, Drainage, Concrete, Soils, Structural properties, Moisture, Permafrost, Surveying, Hydrology, Helicopters, Urban areas, Meteorological parameters, USSR

Contents: Basic concepts of the general plan of airports; Dimensions of the movement area and of the airfield marginal area; Projection of airfield relief; Drainage of flying-field territory; Design of artificial airport pavements; Design and construction of airport pavements; Design of airports in complex geographical conditions; Survey of airports and design.

**AD-622 555 Div. 33/1 ,14/7**
**CFSTI Prices: HC $3.00 MF $0.75**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**AIRFIELD MARKING PAINTS. I. EFFECT ON CRACKING OF SLURRY SEAL.**
Technical rept. for Jul 64-May 65,
by R. W. Drisko. Oct 65, 67p. Rept. no. TR-R-400
Proj. Y R007 08 03 303
Unclassified report

Descriptors: (*Landing fields, Paints), (*Paints, Degradation), Markers, Pavements, Coatings, Asphalt, Runways, Damage, Tests, Statistical analysis

A study is being conducted to determine the basic causes of early failure of airfield marking paints and the deterioration of underlying slurry seal and asphaltic pavement associated with these paints. In the present report, data and statistical analyses are presented on the initial cracking of slurry seal along the edges of stripes of 20 experimental paint formulations. Such cracking, which in some cases occurred as early as 2 weeks after application, was generally followed by edge lifting and then by loss of adhesion of slurry seal to the underlying asphaltic pavement. Stripes of paint containing chlorinated rubber cracked extremely rapidly, especially such stripes with a double thickness. Alkyd painted stripes generally had less cracking than oleoresinous painted stripes. Poorer performance of alkyd paints was associated with a solvent of high boiling range, and poorer performance of oleoresinous paints with solvents of low aromaticity. The addition of a slight amount of carbon black to the test paints raised the temperatures of stripes to only a very slight extent. This addition improved the performance of some test paints but lowered it for others. Stripes with greater flexibility generally had less edge cracking. There were numerous interactions between the above paint variables. Further causes of marking paint failure and the related damage to pavements and slurry seals are being investigated and will be reported later. (Author)

**AD-622 862 Div. 33/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER ATLANTIC CITY N J*
**EVALUATION OF AIRPORT LIGHTING CONTROL PANEL.**
Final rept.,
by Morris Ritter. Aug 65, 38p. Proj. 450 503 03V
SRDS , RD-65-100
Unclassified report

Descriptors: (*Air traffic control systems, Landing aids), (*Control panels, Landing aids), (*Landing aids, Control panels), Command and control systems, Lighting equipment, Airport control towers, Marker lights, Runways, Tests

The Airport Lighting Control Panel consisting of the Approach Lighting System (ALS) and Visual Approach Slope Indicating System (VASI) remote control units was evaluated. The purpose of the project was to determine the operational suitability of the panel for use in the new tower cab configuration. It was concluded that the basic panel consisting of the ALS and VASI remote control units would be operationally suitable for use as an Agency standard provided modifications in the following areas were incorporated: (1) Color, contrast, size and type of backlighted pushbuttons; (2) audio alarm system, and (3) labeling (panel and backlighted pushbuttons). It was further concluded that an interface problem exists between the new ALS panel and field configurations other than the one defined in this report and that an investigation of this area must be accomplished prior to adoption of the ALS remote unit as an Agency standard. It was recommended that the basic panel consisting of the ALS and VASI remote control units be adopted for use in the newly designed FAA tower cabs after the modifications and investigations indicated have been performed. However, inasmuch as no long term reliability data were recorded during this evaluation, either a reliability paper study or testing in an operational facility should be performed to establish failure rates prior to adoption as an Agency standard. (Author)

**AD-622 454** **See Fld. 1/3**

**AD-622 865** **See Fld. 17/7**

## 3/1. ASTRONOMY

**AD-622 361 Div. 2/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**NEWS ABOUT MERCURY (CARBON DIOXIDE HAS BEEN REVEALED IN THIS PLANET'S ATMOSPHERE).**
8 Oct 65, 5p. Rept. no. FTD-TT-65-1240
TT , 65-64151
Unclassified report

Unedited rough draft trans. from Pravada, Moscow (USSR) 15 Jan 2p 1964.

Descriptors: (*Mercury (Planet), Planetary atmospheres), (*Planetary atmospheres, Carbon dioxide), Astronomy, Spectroscopy

Vasiliy Moroz, while observing Mercury made a new and interesting discovery. He investigated the farinfrared region of the spectrum of Mercury on long waves, 1.1 - 3.9 microns. No photo plates are sensitive to these rays, and the spectrum was not photographed, but recorded by a photoelectric spectrometer connected to a 125 cm telescope reflector. An analysis of the recordings revealed a band of carbon dioxide at wavelengths of 1.575 - 1.606 microns. Calculations showed that 5.2 grams of carbon dioxide was contained over each square centimeter of Mercury's surface. The atmospheric pressure on the planet was established: 1.9 milibars.

**AD-622 385 Div. 2/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**BROAD BAND RADIOINTERFEROMETER,**
by V. V. Vitkevich. 17 Sep 65, 9p. Rept. no. FTD-TT-65-821
TT , 65-64162
Unclassified report

Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, v91 n6 p1301-3 1953.

Descriptors: (*Radio interferometers, Broadband), USSR, Radio astronomy, Antennas

The change in radio radiation spectrum of the receiving source will lead, apparently to a change in width of interference pattern of radio reception. Consequently the broad band interferometer can be used as a measuring medium for the spectral composition of the radiating object. A broad band interferometer with several antennas may create a 'knife like' radio reception pattern.

**AD-622 389 Div. 2/1 ,20/1 ,8/6**
**CFSTI Prices: HC $7.00 MF $1.50**
*RAND CORP SANTA MONICA CALIF*
**COMPUTATIONAL ASPECTS OF INVERSE PROBLEMS IN ANALYTICAL MECHANICS, TRANSPORT THEORY, AND WAVE PROPAGATION,**
by Harriet Kagiwada. Aug 65, 310p. Rept. no. RM-4549-ARPA
Contract SD79 Proj. arpa order 189-61
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Celestial mechanics, Numerical analysis), (*Neutron transport theory, Dynamic programming), (*Electromagnetic wave reflections, Numerical analysis), Programming (Computers), Propagation, Boundary value problems

An investigation of inverse problems as basic problems in science, in which physical systems are to be identified on the basis of experimental observations. These problems are especially important in astrophysics and astronomy, for their objects of investigation are frequently not observable in a direct fashion. Solar and stellar structure, for example, is estimated from the study of spectra, while the structure of a planetary atmosphere may be deducted from measurements of reflected sunlight. This memorandum shows that a wide class of inverse problems may now be solved with high-speed computers and modern computational techniques. (Author)

**AD-622 415 Div. 2/1 ,25/5**
**CFSTI Prices: HC $3.00 MF $0.75**
*RAND CORP SANTA MONICA CALIF*
**EQUILIBRIUM THEORY OF GALACTIC ISOPLETHS: A RELATIVISTIC ANALYSIS,**
by Dominic G. B. Edelen. Sep 65, 84p. Rept. no. P-3221
Unclassified report

Descriptors: (*Galaxies, Configuration), (*Relativity theory, Galaxies), Geometry, Dynamics, Field theory, Tensor analysis, Ellipsoids, Density, Luminescence

A complete summary is given of analyses of problems involved in the relativisitic description of galactic structures from the standpoint of hypersurfaces of geometric equilibrium that carry jump discontinuities in the momentumenergy tensor. A reasonable theory is developed for the observed morphology of E and SO galaxies. Several tentative predictions are made concerning the diameters of E galaxies.

**AD-622 416 Div. 2/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**ON THE APPARENT BRIGHTNESS OF THE EARTH'S HALO,**
by R. C. Moore, and G. F. Schilling. Sep 65, 26p. Rept. no. P-3232
Unclassified report

Descriptors: (*Earth, Optical properties), (*Sky brightness, Numerical analysis), (*Atmosphere, Brightness), Light, Scattering, Twilight, Atmospheric refraction, Orbital trajectories, Illumination

Quantitative estimates of the brightness of the terrestrial halo at specific distances from within the shadow cone of the earth were obtained by a method that combines refraction and multiple scattering theory with observed twilight phenomena. Results are presented for a range of radial altitudes from 10,000 km to 250,000 km. Both the luminance, or surface brightness, of the atmospheric halo and the total brightness, or illumination, received by an observer within this altitude range are given. (Author)

**AD-622 516 Div. 2/1**
**CFSTI Prices: HC $3.00 MF $0.50**
*LOCKHEED-CALIFORNIA CO BURBANK PHYSICAL AND LIFE SCIENCES LAB*
**STUDIES OF FLARE-ASSOCIATED FILAMENT PHENOMENA.**
Final technical rept.,
by S. F. Smith. Jul 65, 54p. Rept. no. LR-19038
Contract Nonr453700

Unclassified report

Descriptors: (*Solar flares, Absorption), Analysis, Functions, Brightness, Ejection, Time

A study was made of the phenomena most frequently observed to occur or change preceding or accompanying the development of major flares. The changes referred to are only those occurring in the immediate vicinity of the flares and within two hours preceding the start of the flares. The frequency of occurrence of the observed changes were analyzed as a function of the time of occurrence relative to flare start, the wavelength of the observations, and the position on the solar disk. Preflare changes in absorption features were found to follow a definite statistical pattern. Two other events or changes were found to occur frequently within the same time interval as the pattern of changes in absorption features. These are (1) preflare brightenings and (2) bright and/or dark ejective phenomena.

**AD-622 563 Div. 2/1 ,25/4**
**CFSTI Prices: HC $3.00 MF $0.50**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS SPACE PHYSICS LAB*
**A RAY-TRACING PROGRAM FOR BIREFRINGENT FILTERS.**
Instrumentation paper,
by J. M. Beckers, and R. B. Dunn. Aug 65, 53p.
Rept. no. IP-75
Proj. 7649 Task 764906
AFCRL , 65-605

Unclassified report

Descriptors: (*Solar spectrum, Optical filters), (*Optical filters, Refraction), (*Refraction, Programming (Computers)), Wave transmission, Spectrum analyzers, Polarizing filters, Line spectrum, Quartz, Calcite, Numerical analysis

A computer program for determining the transmission of birefringent filters is described. This program is used for the following investigations: (a) The feasibility of the construction of a birefringent filter that will work simultaneously for wavelengths of 3933.3, 6562.8, and 10830.3 Angstroms. These three wavelengths are of particular importance for solar studies; (b) the off-axis characteristics of Solc filters; (c) the tolerances required for the elements of a Solc filter; (d) the influence of imperfect polarizers on the transmission characteristics of Lyot filters. (Author)

**AD-622 564 Div. 2/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS SPACE PHYSICS LAB*
**A SURVEY OF RADIO OBSERVATIONS OF SOLAR ECLIPSES.**
Special repts.,
by John P. Castelli, and Jules Aarons. Aug 65, 82p.
AFCRL ,AFCRL 65-533, ,SR-30

Unclassified report

Descriptors: (*Solar eclipses, Radio astronomy), (*Radio astronomy, Solar eclipses), Radiofrequency spectroscopy, Bibliographies

A survey of reported radio observations of solar eclipses is presented. The eclipse has revealed the radio spectra of the solar centers of activity, the contribution of the corona to meter wavelength solar flux, the radio diameter of the sun at various wavelengths, and the height of the emitting regions. Eclipse studies have shown the portions of the radio spectrum where limb brightening is observed as well as those characterized by limb darkening. Through a detailed study of the results of major eclipses which have been observed, many aspects of solar radio measurements are considered. Appendices include a bibliography, as well as abstracts, on radio measurements of eclipses, together with details of data reduction techniques used in eclipse observations. (Author)

**AD-622 768 Div. 2/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**A MORPHOLOGICAL CLASSIFICATION OF E AND SO GALAXIES IN TERMS OF EQUILIBRIUM ISOPLETHS,**
by Dominic G. B. Edelen. Feb 65, 33p. Rept. no. P-3065

Unclassified report

Descriptors: (*Astrophysics, Galaxies), (*Galaxies, Geometric forms), Celestial mechanics, Optical properties, Correlation techniques, Tensor analysis, Partial differential equations

**AD-622 935 Div. 2/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**SURFACE CHARACTERISTICS OF MARS, VENUS, AND THE MOON: ANNOTATED BIBLIOGRAPHY.**
AID Work assignment no. 35, task 13.
10 Feb 64, 47p. Rept. no. AID-U-64-5
TT , 65-64280

Unclassified report

Descriptors: (*Astronomy, Bibliographic), (*Mars, Surface properties), (*Venus, Surface properties), (*Moon, Surface properties), Radio astronomy, Extraterrestrial topography, Light, Polarization, Albedo (Astronomy), Astronomical data, USSR

This annotated bibliography of Soviet planetary studies contains data from 1960 to mid-1963. Sovietbloc research of the surface characteristics of Mars, Venus, and the Moon with reference to light polarization and albedo measurement techniques as well as radioastronomical studies are included.

**AD-622 968 Div. 2/1**
*FLORIDA UNIV GAINESVILLE DEPT OF PHYSICS AND ASTRONOMY*
**JUPITER,**
by Alex G. Smith. 1965, 4p.
AROD , 2083:35

Unclassified report

Pub. in McGraw-Hill Yearbook Science and Technology p232-4 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Jupiter, Radio astronomy), (*Radio astronomy, Jupiter), Extraterrestrial radio waves, Sources, Celestial mechanics, Astrophysics, Theory

Theory of Jupiter's long-wavelength radio sources.

**AD-622 971 Div. 2/1**
*FLORIDA UNIV GAINESVILLE DEPT OF PHYSICS AND ASTRONOMY*
**JUPITER'S DECAMETRIC EMISSION CORRELATED WITH THE LONGITUDES OF THE FIRST THREE GALILEAN SATELLITES,**
by G. R. Lebo, Alex G. Smith, and T. D. Carr.
16 Apr 65, 3p.
AROD , 2083:36

Unclassified report

Pub. in Science v148 n3678 p1724-5 25 Jun 1965 (Copies not available to DDC or Clearinghouse customers). Research supported in part by NSF and ONR.

Descriptors: (*Jupiter, Radio astronomy), (*Celestial mechanics, Jupiter), High frequency, Extraterrestrial radio waves, Geodesics

An analysis of data obtained at a variety of frequencies since 1957 has confirmed Bigg's observation that the satellite Io appears to control the emission of decametric radio energy by Jupiter. The correlation is stronger when intensity, rather than simple probability, is included in the analysis. There is also evidence of a similar influence by the satellites Europa and Ganymede. (Author)

**AD-622 972 Div. 2/1**
*FLORIDA UNIV GAINESVILLE DEPT OF PHYSICS AND ASTRONOMY*
**CIRCULARLY POLARIZED COMPONENTS OF THE DECAMETER RADIATION FROM JUPITER,**
by T. D. Carr, S. Gulkis, H. Bollhagen, D. J. Kennedy, and A. G. Smith. 1965, 1p.
AROD , 2083:37

Unclassified report

Pub. in American Institute of Physics for the American Astronomical Society v70 n5 Jun 1965 (Copies not available to DDC or Clearinghouse customers). Prepared for presentation at the Meeting of the American Astronomical Society (118th), 14-17 Mar 1965 at Kentucky Univ., Lexington.

Descriptors: (*Jupiter, Radio astronomy), (*Radio astronomy, Jupiter), High frequency, Extraterrestrial radio waves, Polarization, Measurement, Astrophysics

**AD-622 973 Div. 2/1**
*FLORIDA UNIV GAINESVILLE DEPT OF PHYSICS AND ASTRONOMY*
**CORRELATION OF THE LONGITUDES OF THE GALILEAN SATELLITES WITH JUPITER'S DECAMETRIC RADIATION,**
by G. R. Lebo, Alex. G. Smith, and T. D. Carr.
1965, 1p.
AROD , 2083:38

Unclassified report

Pub. in American Institute of Physics for the American Astronomical Society v70 n5 Jun 1965 (Copies not available to DDC or Clearinghouse customers). Prepared for presentation at Meeting of the American Astronomical Society (118th), 14-17 Mar 1965 at Kentucky Univ., Lexington. Research supported in part by NSF, ONR, and NASA.

Descriptors: (*Jupiter, Radio astronomy), (*Radio astronomy, Jupiter), Extraterrestrial radio waves, Amplitude modulation, Astrophysics, Celestial mechanics

**AD-622 985 Div. 2/1 ,30/2 ,15/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH MATHEMATICS RESEARCH LAB*
**THE COMPUTATION OF CHARACTERISTIC EXPONENTS IN THE PLANAR RESTRICTED PROBLEM OF THREE BODIES,**
by Andre Deprit, and J. F. Price. Jul 65, 83p.
Rept. no. MN-415 ,D1-82-0450

Unclassified report

Also available from the authors.

Descriptors: (*N-body problem, Celestial mechanics), (*Celestial mechanics, N-body problem), (*Programming (Computers), Celestial mechanics), Numerical analysis, Hamiltonian, Power series, Differential equations, Integration, Calculus of variations

The canonical equations of motion in barycentric synodical Cartesian coordinates and momenta are

integrable by means of recurrent power series; these series are proved to be convergent for initial conditions anywhere in the phase space except in the two phase planes of binary collisions. The integration by recurrent power series is extended to the variation equations. It is used to compute the monodromy matrix associated to the fundamental period of a periodic orbit. A simple formula is derived, which relates the trace of the monodromy matrix and the characteristic exponents. These numerical methods are applied to evaluate the characteristic exponents of Rabe's Trojan Orbits; they are found to be of the stable type for the ovals, and of the unstable type for the horse-shoe shaped orbit. When the periodic orbit is symmetric with respect to the axis of syzygies, four independent variational solutions computed only over half the period are shown to be sufficient for evaluating the characteristic exponents. (Author)

**AD-622 987 Div. 2/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**COMMENTS ON THE DETECTION OF WATER AND ICE CLOUDS ON VENUS,**
by D. Deirmendjian. Oct 65, 14p. Rept. no. P-3245
Unclassified report

Presented at the JPL/CIT Conference on the Moon and Planets, Pasadena, Calif., 13-18 Sep 65.

Descriptors: (*Venus, Clouds), (*Planetary atmospheres, Venus), (*Astronomy, Venus), Water vapor, Ice, Infrared spectroscopy

Recent infrared spectroscopic evidence of the existence of ice clouds on Venus is verified by comparison with the spectra of optically dense, terrestrial sunlit cirrus clouds. The uncertainties regarding the total water content of the planetary atmosphere are pointed out, and an experiment is proposed for the detection of possible water droplet clouds, otherwise obscured by the observed ice clouds. (Author)

**AD-623 063 Div. 2/1 ,2/8**
*ARIZONA UNIV TUCSON*
**WAVELENGTH DEPENDENCE OF POLARIZATION. IV. VOLCANIC CINDERS AND PARTICLES,**
by David L. Coffeen. 29 Dec 64, 11p.
Unclassified report

Pub. in Astronomical Journal v70 n6 p403-13 Aug 1965 (Copies not available to DDC or Clearinghouse customers). Work supported by ONR Suppl to Final rept. of Grant Nonr G00075 64.

Descriptors: (*Astrophysics, Moon), (*Moon, Optical properties), Earth, Volcanoes, Dust, Particles, Extraterrestrial topography, Correlation techniques, Optical analysis, Light, Polarization

Five laboratory samples were measured for comparison with the moon, using a Wollaston photopolarimeter with filters near 0.36, 0.53, and 0.97 micron, having the sun as light source. Three of the samples were porous dust layers of ground volcanic cinder particles smaller than 37 micron in 'fairy-castle' structures. The other two were: a porous but solid lava fragment, and the same fragment covered with a fairy-castle dust layer made from the same lava. The solid lava fragment is more highly polarized than the moon, and has essentially no wavelength dependence. The wavelength and phase dependence of the lunar polarization is closely matched by the fairycastle structures. No dependence of polarization on sample orientation was found for the volcanic materials. Differential photometry was done with the same filters using a smoked MgO layer as comparison. All samples show a linear brightness increase (in magnitudes) from 50 deg to 20 deg phase, similar to the moon. The fairycastle structures shown an appreciable opposition effect in the ultraviolet which, however, almost disappears in the green and infrared. (Author)

**AD-623 064 Div. 2/1 ,25/4**
*ARIZONA UNIV TUCSON LUNAR AND PLANETARY LAB*
**FIVE-COLOR PHOTOMETRY OF THE BRIGHT STARS.**
Final rept.,
by Braulio Iriarte, Harold L. Johnson, Richard I. Mitchell, and Wieslaw K. Wisniewski. 1965, 12p. Contract NonrG00018 65
Unclassified report

Pub. in Sky and Telescope v30 n1 p1-11 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Stars, Colorimetry), (*Astrophysics, Stars), (*Colorimetry, Stars), Spectroscopy, Astronomical data

A listing of magnitudes and colors for 1,325 stars, including those easily visible to the naked eye north of declination --50 deg, is presented. The V values are essentially visual magnitudes, but of far greater precision than in any extended lists available up to a few years ago. Good photographic (blue) magnitudes for bright stars can be obtained by adding the V values to the B -- V color indexes in the catalogue. Other color data there range from ultraviolet to infrared.

**AD-622 485** **See Fld. 9/2**

**AD-622 784** **See Fld. 17/9**

**AD-622 886** **See Fld. 8/14**

**AD-622 898** **See Fld. 4/2**

**AD-622 906** **See Fld. 7/4**

## 4/2. METEOROLOGY

**AD-622 301 Div. 2/7 ,30/2**
**CFSTI Prices: HC $3.00 MF $0.50**
*UNITED NUCLEAR CORP WHITE PLAINS N Y DEVELOPMENT DIV*
**A DESCRIPTION OF AN IBM-7090 MONTE CARLO PROGRAM (UNC-90-6) FOR THE SOLUTION OF THE TIME DEPENDENT NEUTRON TRANSPORT PROBLEM IN AN ATMOSPHERE WITH DENSITY DEPENDENT ON HEIGHT,**
by C. Marotta, and W. Guber. 15 Apr 62, 55p. Rept. no. UNC-5006
Contract DA49 186ORD1012 Proj. 2172
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale. See also AD-294 333.

Descriptors: (*Neutron transport theory, Programming (Computers)), (*Neutrons, Atmosphere), Neutron flux, Neutron detectors, Monte Carlo method, Sampling, Time, Energy

This report describes an IBM-7090 Monte Carlo program for the transport of neutrons from a point monoenergetic source in an atmosphere with density dependent on height, extending up to 700 kilometers above ground zero. The earth is treated as an absorbing surface. The neutron flux is calculated at specified detector regions as a function of time and energy. A simple but effective importance sampling technique is incorporated in the program to improve statistics at detectors many mean free paths from the source. A Final Edit Program is described in this report which can be used to superpose, with specified weighting, the results of various monoenergetic sources. (Author)

**AD-622 304 Div. 2/7 ,9/1**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**TURBULENT ATMOSPHERIC PARAMETERS BY CONTAMINANT DEPOSITION.**
Environmental research papers,
by S. P. Zimmerman. 4 Oct 64, 19p. Rept. no. ERP-129 ,AFCRL-65-632
Proj. 8605 Task 860510
Unclassified report

Pub. in Journal of Applied Meteorology v4 n2 p279-88 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atmospheric motion, Flow visualization), (*Flow visualization, Atmospheric motion), (*Turbulence, Atmospheric motion), Wind-direction indicators, Smokes, Chemicals, Diffusion, Wind, Transport properties

Many contaminant of smoke-puff experiments have been performed in the atmosphere to determine certain significant parameters of atmospheric turbulence. This paper presents a reanalysis of some of these experiments, using a technique suggested by Frenkiel and Katz. The results show that the similarity theory of Batchelor, as suggested by Gifford, and the subsequent theory of Lin, explain atmospheric turbulence for the case of low wind shears. Turbulent dispersion in the presence of high wind shears, however, follows the diffusion relation theorized by Tchen. Values for epsilon, the rate of eddyenergy density dissipation per unit mass, are measured, substantiating some of Gifford's estimates; also measured are the universal and absolute constant Csub 1 and alpha, respectively, of Batchelor, and sq v, the turbulent energy density per unit mass, which are compared to some measurements of Frenkiel and Katz, and of Kellogg. (Author)

**AD-622 305 Div. 2/7**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**N2 (+) IONS AT TWILIGHT.**
Environmental research papers,
by William Swider,Jr.. 30 Jan 65, 21p. Rept. no. ERP-127 ,AFCRL-65-630
Proj. 8605 Task 860509
Unclassified report

Pub. in Planetary and Space Sciences v13 p529-40 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Photochemistry, Upper atmosphere), (*Ions, Upper atmosphere), (*Nitrogen, Upper atmosphere), (*Twilight, Photochemistry), Solar radiation, Ultraviolet radiation, Gas ionization, Dissociation, Recombination reactions, Molecular properties, Geophysics

The columnar content of molecular nitrogen ions at twilight is shown to be due to the normal action of the extreme ultraviolet flux on the upper atmosphere. The augmentation of the N2 (+) ion content with solar activity at early twilight is seen to depend mainly on a similar increase of molecular nitrogen in the upper F-region. Uncertainties in the parameters determining the N2 (+) ion content are discussed, particularly the dissociative recombination rate for molecular nitrogen ions. The effect of departures from photoequilibrium at twilight is introduced. The daytime N2 (+) ion content is briefly discussed. (Author)

**AD-622 316 Div. 2/7 ,9/1**
*WASHINGTON UNIV SEATTLE DEPT OF ATMOSPHERIC SCIENCES*
**EDDY DIFFUSION AND SETTLING SPEED IN BLOWN SNOW.**
Technical rept.,
by J. A. Businger. 3 Nov 64, 8p. Rept. no. TR-15

Contract Nonr47724 Proj. NR307 252
Unclassified report

Pub. in Geophysical Research v70 n14 p3307-13 Jul 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Snow, Atmospheric motion), (*Atmospheric motion, Snow), Vortices, Diffusion, Falling bodies, Velocity, Wind, Transport properties, Arctic regions

In an analysis of observations of snow density taken in the Arctic, Sommerfeld and Businger have shown that the ratio of eddy diffusivity for blowing snow is almost an order of magnitude larger than the eddy viscosity derived from the wind profile. In this paper an attempt has been made to explain how this eddy diffusivity could be so large. It has been shown that for fall velocities greater than the standard deviation of the vertical wind component the average snow density is mainly determined by the upward-moving snow particles. From a combination of this result with a simple generalization of Prandtl's mixing length concept an effective eddy diffusivity has been derived which indeed may become as large as that observed. The effect of turbulence on the average settling speed of snow particles has also been analyzed. The average settling speed is considerably reduced by turbulence when the average wind speed is greater than 20 m/sec. The reduction becomes particularly significant if the settling speed in calm air is small (e.g., 50 cm/sec), in which case it is sufficient to give a reasonable description of the Antarctic data reported by Mellor and Radok. (Author)

**AD-622 317 Div. 2/7 ,9/1**
*WASHINGTON UNIV SEATTLE DEPT OF ATMOSPHERIC SCIENCES*
**THE DENSITY PROFILE OF BLOWN SNOW.**
Technical rept.,
by R. Sommerfeld, and J. A. Businger. 3 Nov 64, 5p. Rept. no. TR-16
Contract Nonr47724 Proj. NR307 252
Unclassified report

Pub. in Journal of Geophysical Research v70 n14 p3303-6 Jul 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Snow, Atmospheric motion), Colloids, Atmosphere, Wind, Density, Optical scanning, Meteorology, Fluid mechanics

An optical technique for measuring the density of snow suspended in air has been developed. This technique has the advantage of minimum interference with the air stream and of instantaneous response. Measurements of the vertical profile of snow density indicate that the eddy diffusivity for the snow must be an order of magnitude larger than the eddy viscosity obtained from the wind profile. This striking dissimilarity between mass and momentum flux is also suggested by the experiments of Mellor and Radok. (Author)

**AD-622 371 Div. 2/7 ,30/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*STANFORD RESEARCH INST MENLO PARK CALIF*
**MEASUREMENT OF NITRIC OXIDE IN THE EARTH'S ATMOSPHERE.**
Interim rept.,
by Robert A. Young. 31 Jan 65, 38p. Contract DA49 146XZ112 Proj. SRI PAU3895
DASA , 1419-1
Unclassified report

Descriptors: (*Atmospheric sounding, Ionosphere), (*Nitrogen compounds, Ionosphere), (*Ionosphere, Nitrogen-compounds), (*Oxides, Nitrogen compounds), Instrumentation, Measurement, Sounding rockets, Theory

The report describes progress in development of rocket-borne nitric oxide detectors.

**AD-622 396 Div. 2/7 ,12/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*AEROMETRIC RESEARCH INC GOLETA CALIF*
**RELATIONSHIPS BETWEEN TIROS CLOUD PATTERNS AND AIR MASS (WIND AND THERMAL) STRUCTURE.**
Final rept.,
by Robert D. Ellott, and John R. Thompson. Sep 65, 61p. Contract N189 188 58870A
NWRF , 33-0965-109
Unclassified report

Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Meteorological satellites, Cloud cover), (*Cloud cover, Air mass analysis), Meteorological parameters, Wind, Atmospheric temperature, Clouds, Aerial photography, Radiosondes, Climatology, Weather forecasting, Meteorological charts, Statistical analysis, Tables

In recent years considerable effort has been expended in relating Tiros cloud patterns to synoptic analyses with certain worthwhile results. However, little effort has been made to relate the cloud patterns directly to the air mass structure and associated physical processes. This study has been aimed at relating the cloud patterns to wind at various levels, wind shear, thermal advection, vertical differences therein, and air mass stability. Over 300 ship or shoreline radiosonde observations were used in conjunction with nearly simultaneous Tiros photographs to develop statistical summaries of these parameters and their relationship to cloud patterns. Models of the synoptic climatology of Tiros cloud patterns for a generalized cyclonic system are presented which relate the above parameters to the cloud patterns in a way that is consistent with the various physical processes that generate and spread cloud. Statistical tables are provided relating air mass parameters to specific cloud forms. These tables present the information in a variety of forms useful to the forecaster. (Author)

**AD-622 439 Div. 2/7 ,25/4**
*SASKATCHEWAN UNIV SASKATOON DEPT OF PHYSICS*
**SOME OBSERVATIONS OF TYPE-B RED AURORA WITH A MULTICHANNEL PHOTOMETER.**
Scientific rept.,
by W. F. J. Evans, and A. Vallance Jones. 14 Dec 64, 13p. Rept. no. SR-DR-9
Contract AF19 628 2829 Proj. 7661 Task 766102
AFCRL , 65-479
Unclassified report

Pub. in Canadian Journal of Physics v43 p697-704 1965 (Copies available only to DDC users).

Descriptors: (*Aurorae, Brightness), Measurement, Photometers, Optical properties, Atomic spectroscopy, Meteorological phenomena

A five-channel interference filter photometer was used to make observations of the relative brightnesses of the First Positive Group N2 bands, the lambda-3914 N2 (+) band, the lambda-5577 (OI) line, and the First Negative O2 bands in type-B red aurora. It was found that the time delay between the emission of the 1NG N2 (+) bands and the 1PG N2 bands was less than 0.1 second in disagreement with the O2 (-)/N2 (+) charge neutralization mechanism for the enhancement of the First Positive Group bands. The lifetime of the O ( (1)S) atoms emitting the green line was determined by the method of Omholt (1959) by comparing fluctuations in the emission of the green line with those of the N2 (+) bands. In type-B red aurora it was found that this lifetime corresponded to 0.48 = 0.06 second as compared with 0.67 = 0.06 second in normal aurora. This may indicate that collisional deactivation of the O ( (1)S) state occurs in type-B red aurora and is one factor contributing to the reddening. The relative brightness measurements showed, for type-B red aurora compared with normal aurora, an appreciable intensification (50%) of the 1PG emission compared to the 1NG N2 (+) bands. At the same time there was observed an average decrease of about 30% in the intensity of the green line compared to the 1NG bands. (Author)

**AD-622 440 Div. 2/7 ,25/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*SASKATCHEWAN UNIV SASKATOON DEPT OF PHYSICS*
**DATA FOR THE CALCULATION OF TWILIGHT OBSERVATION PROGRAMMES.**
Scientific rept.,
by A. Vallance Jones. May 65, 21p. Rept. no. SR-DR-11
Contract AF19 628 2829 Proj. 7661 Task 766102
AFCRL , 65-407
Unclassified report

Descriptors: (*Twilight, Angle of arrival), (*Sky brightness, Twilight), (*Solar radiation, Twilight), (*Atmosphere, Optical properties), Sun, Light transmission, Refraction, Absorption, Optics, Boundary value problems, Celestial mechanics, Mathematical programming

A general solution is given to the problem of constructing twilight programmes so that the direction of observation may intersect the boundary between dark and illuminated regions of the atmosphere at a specified height above the surface of the earth. Atmospheric refraction and absorption and the angular extent of the sun are neglected. These quantities must be taken into account separately. Curves giving the results of calculations from the twilight equations are reproduced. These curves are sufficient for the construction of twilight programmes for heights between 30 and 560 km. (Author)

**AD-622 441 Div. 2/7 ,6/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**ANGELS IN FOCUS.**
Environmental research papers,
by David Atlas. 13 Nov 64, 14p. Rept. no. AFCRL-65-582 ,ERP-124
Proj. 6672 Task 667205
Unclassified report

Pub. in Radio Science Journal of Research NBS/USNC-URSI v69D n6 p871-5 Jun 1965. Presented at World Conference on Radio Meterology 14-18 Sep 1964, National Bureau of Standards, Boulder, Colorado.

Descriptors: (*Radar echo areas, Physical properties), Coherent radar, Radar reflections, Convection, Bubbles, Meteorological radar, Radar signals, Doppler radar

Recent independent observations of 'dot' angel echoes are drawn together to provide a coherent picture of their physical structure. The 'dot' or 'poing' angel is a transitory echo associated with an invisible atmospheric target passing through a fixed radar beam whose duration generally corresponds to the time of transport of a point source across the beam with the wind speed. The observations are shown to be consistent with specular reflections from the hemispherical, concave-downward cap of a rising thermal or convective bubble. (Author)

**AD-622 526 Div. 2/7 ,25/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*CALIFORNIA UNIV LOS ANGELES DEPT OF METEOROLOGY*
**INVESTIGATIONS OF THE POLARIZATION OF THE SUNLIT SKY.**

Scientific rept.,
by George C. Holzworth, and C. R. Nagaraja Rao.
Feb 65, 82p. Rept. no. SR-1
Contract AF19 628 3850 Proj. 7621 Task 762103
AFCRL , 65-167

Unclassified report

Descriptors: (*Solar radiation, Polarization), (*Atmosphere, Optical properties), (*Optics, Meteorological phenomena), Sky brightness, Electromagnetic waves, Scattering, Aerosols, Photoelectric effect, Polariscopes

Theoretical studies of the features of skylight polarization based on the solution of the radiative transfer problem in a plane-parallel molecular atmosphere are briefly reviewed. The results of a series of systematic measurements of skylight polarization are presented and discussed. The measurements were made at Los Angeles during Spring 1963. A photoelectric skylight polarimeter employing ac light modulation has been employed in these measurements which were confined to three spectral intervals (bandwidth approx. 150 A) centered around 4000, 5100 and 6000 A. An attempt has been made to account for the departure of the location and dispersion of the neutral points and the polarization maxima from the computed values for a purely molecular atmosphere in terms of the local turbidity. The effect of the variable reflectivity of the ground on the magnitudes of polarization maxima has been studied. (Author)

**AD-622 538 Div. 2/7 ,2/6**
*IOWA UNIV IOWA CITY DEPT OF PHYSICS AND ASTRONOMY*
**ON THE LOCAL-TIME DEPENDENCE OF OUTER RADIATION ZONE ELECTRON (E > 1.6MEV) INTENSITIES NEAR THE MAGNETIC EQUATOR,**
by L. A. Frank. 24 May 65, 8p. Contract Nonr150906 Grant ,NsG233 62

Unclassified report

Pub. in Journal of Geophysical Research v70 n17 p4131-8 Sep 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electron density, Upper atmosphere), (*Terrestrial magnetism, Upper atmosphere), (*Solar wind, Terrestrial magnetism), (*Magnetic storms, Solar wind), Atmospheric sounding, Satellites (Artificial), Magnetohydrodynamics, Diurnal variations, Space environmental conditions

**AD-622 545 Div. 2/3 ,2/7 ,2/2**
*ARMY NATICK LABS MASS*
**MONTHLY MAPS OF MEAN DAILY INSOLATION FOR THE UNITED STATES,**
by Iven Bennett. 1965, 15p.

Unclassified report

Pub. in SOLAR Energy v9 n3 p145-52 Jul-Sep 1965 (Copies not available to DDC or Clearinghouse customers). Presented at the Solar Energy Society Conference, Phoenix, Ariz., 15-17 Mar 1965.

Descriptors: (*Climatology, Solar radiation), (*Solar radiation, Maps), (*Meteorological charts, Solar radiation), (*Maps, Solar radiation), Weather stations, Meteorological parameters, Atmosphere, Optical properties, Correlation techniques

Traditional problems in the preparation of climatic maps of insolation involve the quality and scarcity of data. There is little the climatologist can do to improve data quality, but, in some cases, he can take steps to increase the quantity of usable data. In some parts of the world insolation is measured regularly at a few locations as part of a widespread and systematic climatic data-collection program. Several investigators have shown that analysis of data from the few available insolation stations in such areas will reveal empirical relationships between insolation and climatic elements measured at many other locations, and that the resulting relationships can be used successfully to estimate insolation for places lacking data and to fill gaps in the records of insolation stations. The application of this technique to the United States is the subject of this paper. Between 1950 and 1962, 59 stations in the contigous United States maintained records of insolation suitable for climatic analysis. The relationships between insolation and more widely available variables--percent of possible sunshine, cloud cover, presence or absence of snow on the ground, and station elevation--are established through simple and multiple regression analysis, and tested for use in estimating insolation for 113 stations where insolation is not measured. The regression relationships are also tested and applied to filling in missing data in the records of the insolation stations. The final product consists of 12 monthly maps of the United States showing mean daily insolation. (Author)

**AD-622 621 Div. 2/7**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**TIDAL MOTIONS IN THE HIGH ATMOSPHERE.**
Environmental research papers,
by B. Lettau. 26 Apr 65, 20p. Rept. no. AFCRL-65-660 ,ERP-135
Proj. 8624 Task 862402

Unclassified report

Pub. in Journal of Geophysical Research v70 n14 p3255-63 Jul 15 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 20 Jan 65.

Descriptors: (*Atmospheric tides, Periodic variations), Atmospheric sounding, Wind, Distribution, Atmosphere, Barometric pressure, Oscillation, Meteorology

Previously published data on the semidiurnal variation of ambient pressure and wind speed obtained in the altitude interval from 15 to 130 km with such various sensors as rawninsondes, falling balloons, meteor trail drifts, and chemiluminous gas trails are examined in the contexts of a general model of isallobaric potential flow in the atmosphere and a model of tidal motion. The tidal model determines the variation of the amplitude and phase of the pressure oscillation with height, and, on the assumption that the pressure varies sinusoidally, the isallobaric potential flow model defines explicit relationships between the amplitudes and phases of the pressure and zonal wind oscillations and between the phases of the zonal and meridional wind oscillations. The observed values are compared with those predicted by the model, and it is concluded that the observed wind and pressure data fit an isallobaric pattern with a period of 12 hours and agree for the most part with the specific requirements of a semidiurnal atmospheric tide. In particular, however, the time of maximum of the semidiurnal pressure variation does not correspond to that predicted by present tidal theory. (Author)

**AD-622 623 Div. 2/7 ,20/3**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**THE SIZE DISTRIBUTION OF RADIOACTIVE AEROSOLS IN THE UPPER TROPOSPHERE.**
Environmental research papers,
by Charles W. Chagnon, and Christian E. Junge.
26 Feb 65, 15p. Rept. no. AFCRL-65-679, ERP-139
Proj. 7690 Task 769003

Unclassified report

Pub. in Journal of Applied Meteorology v4 n3 p329-33 Jun 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 14 Sep 64.

Descriptors: (*Aerosols, Radioactivity), (*Radioactivity, Aerosols), (*Troposphere, Aerosols), Particle size, Natural radioactivity, Artificial radioactivity, Fission products, Atmosphere, Meteorology

An aircraft-borne impactor-filter system for the collection of tropospheric aerosols of natural and fission-product origin is described. The system has been used in studies of the size distribution of atmospheric particles as a function of alitutde within the troposphere. Preliminary results indicate a size distribution in mid-troposphere as being intermediate between ground level and lower stratosphere and support the possibility that high level particles undergo a change in size on their descent through the atmosphere. (Author)

**AD-622 634 Div. 2/7**
**CFSTI Prices: HC $2.00 MF $0.50**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**ATMOSPHERIC STRUCTURE IN THE LOWER THERMOSPHERE.**
Air Force surveys in geophysics,
by K. S. W. Champion. Aug 65, 49p. Rept. no. AFCRL-65-539 ,AFSG-168

Unclassified report

Descriptors: (*Atmospheric sounding, Upper atmosphere), (*Upper atmosphere, Physical properties), Density, Atmospheric temperature, Measurement, Satellites (Artificial), Falling bodies, Drag, Oxygen, Nitrogen, Ultraviolet spectroscopy

This review constitutes a revision and up-dating of the report, Atmospheric Structure and its Variations in the Lower Thermosphere (AD-417 201). It has been prepared for inclusion as an appendix in the proposed new edition of the COSPAR International Reference Atmosphere (CIRA). New density data presented and discussed include the results of four falling-sphere density measurements made at White Sands, New Mexico, and densities deduced from drag effects on Explorer XVII and other satellites. The satellite density data is compared with the predictions of several models of Jacchia and Harris and Priester. Temperature data include revised values deduced by Blamont from Doppler broadening of sodium and potassium resonance lines. The new values are in better agreement with theoretical models than the earlier results. Recent composition results include number densities of O2, N2 and O calculated from ultraviolet absorption measurements by Hinteregger, and values of mean molecular mass from Explorer XVII and the rocket measurements of Nier and Schaefer. (Author)

**AD-622 643 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**ON MOUNTAIN UPSLOPE WINDS,**
by Harold D. Orville. 6 Aug 64, 12p. Rept. no. reprint no. 145
Contract Nonr217303

Unclassified report

Pub. in Journal of Atmospheric Sciences v21 n6 p622-33 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mountains, Micrometeorology), (*Micrometeorology, Mountains), (*Wind, Mountains), Convection, Thermodynamics, Meteorology

Equations developed by Ogura (J. atmos. Sci., 19:492502, 1962) for a two dimensional axially symmetric thermal initiation problem are adjusted to two rectilinear dimensions and used in a numerical study of mountain upslope winds. The winds are initiated by an assumed potential temperature change at the surface of a mountain 1 km high with a 45 deg. slope. A level plain 2 km long extends from the base of the mountain. Two cases are considered, one in a neutral environment, the second in a slightly stable environment to approximate conditions over the Santa Catalina Mountains near Tucson, Arizona. A neutral environment leads to formation of a bubble which moves up and away

from the slope. As the bubble rises above the ridge line, some similarities with previous initial-bubble numerical studies are seen. A stable environment slows the development of the upslope winds and causes columnar shaped convection over the mountain slope. The results of the two cases are compared with each other, with previous numerical studies on isolated thermal bubbles and with a few observational studies on upslope winds. Pressure deviations for the model are computed and appear reasonable. Many of the features of the upslope wind are reproduced in the model. (Author)

**AD-622 645 Div. 2/7 ,20/1**
*STANFORD UNIV CALIF STANFORD ELECTRONICS LABS*
**TIME REVERSAL OF THE GEOCYCLOTRON MECHANISM,**
by T. F. Bell. 9 Sep 63, 3p. Contract AF49 638 1060
AFOSR , 65-1389
Unclassified report

Pub. in Journal of Geophysical Research v69 n1 p177-9 Jan 1 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cyclotron resonance phenomena, Geophysics), (*Geophysics, Cyclotron resonance phenomena), Van Allen radiation belt, Charged particles, Electrons, Deceleration, Electromagnetic waves, Ionospheric propagation

The purpose of this report is to outline a possible method of removing high-energy particles from natural or artificially produced radiation belts. This method is based on the idea of the geocyclotron and in essence is the time reversal of the geocyclotron mechanism. In this inverse geocyclotron interaction the object is to deenergize high-energy electrons by means of gyroresonance, a phenomenon in which electrons in the earth's outer ionosphere are decelerated by frequency-modulated, circularly polarized electromagnetic waves generated on the ground. These waves would be guided approximately along the earth's magnetic field lines in the whistler mode until they reach a region suitable for interaction.

**AD-622 650 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**THE OPTICAL CONTINUUM OF LIGHTNING.**
Revised ed.,
by Richard E. Orville, and Martin A. Uman. 7 Oct 64, 4p. Rept. no. reprint no. 146
Contract Nonr217306 Grant ,NSF GP800
Unclassified report

Pub. in Journal of Geophysical Research v70 n2 p279-82 15 Jan 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 3 Sep 64.

Descriptors: (*Lightning, Continuous spectrum), Meteorological phenomena, Atmospheric electricity, Electric discharges, Optical properties, Blackbody radiation

The optical continua of several lightning strokes are presented. In general, the continuum intensity of lightning increases toward the short wavelengths in the wavelength region from 5900 A to 3900 A. There appear to be no significant differences between the form of the intense streaks of continuum and the form of the dim continuum. The plots of continuum intensity versus wavelength have too great a curvature for the continuum to be due to either blackbody radiation or bremsstrahlung emitted at constant temperature. Possible explanations for the observed form of the continuum are advanced. The lightning continuum is found to be similar in form to the continuum of a long laboratory spark in air. (Author)

**AD-622 653 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**ELECTRON DENSITY MEASUREMENT IN LIGHTNING FROM STARK-BROADENING OF H ALPHA,**
Revised ed.,
by Martin A. Uman, and Richard E. Orville. 22 Sep 64, 4p. Rept. no. reprint no. 144
Contract Nonr217306 Grant ,NSF GP800
Unclassified report

Pub. in Journal of Geophysical Research v69 n24 p5151-4 15 Dec 1964 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 3 Aug 64.

Descriptors: (*Lightning, Electron density), Meteorological phenomena, Atmospheric electricity, Electric discharges, Hydrogen, Atomic spectroscopy

Electron densities between 1 X 10 to the 17th power/CC and 5 X 10 to the 17th power/CC are found for three lightning strokes by comparing the profiles of Starkbroadened H alpha lines with theoretical profiles. The results are discussed and compared with electron density determinations made from line intensity measurements. (Author)

**AD-622 655 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**THE MASS DENSITY, PRESSURE, AND ELECTRON DENSITY IN THREE LIGHTNING STROKES NEAR PEAK TEMPERATURE.**
Revised ed.,
by Martin A. Uman, Richard E. Orville, and Leon E. Salanave. 22 Sep 64, 2p. Rept. no. reprint no. 143
Contract Nonr217306 Grant ,NSF GP800
Unclassified report

Pub. in Journal of Geophysical Research v69 n24 p5423-4 15 Dec 1964 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 27 Jul 64.

Descriptors: (*Lightning, Physical properties), Meteorological phenomena, Atmospheric electricity, Electric discharges, Electron density, Pressure, Mass spectrum

**AD-622 656 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**TIME-RESOLVED SPECTRAL EMISSIONS FROM INDIVIDUAL RETURN STROKES IN LIGHTNING DISCHARGES,**
by E. Philip Krider. 10 Feb 65, 2p. Rept. no. reprint no. 153
Contract Nonr217306 Grant ,NSF GP953
Unclassified report

Pub. in Journal of Geophysical Research v70 n10 p2459-60 15 May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lightning, Spectroscopy), Meteorological phenomena, Atmospheric electricity, Electric discharges, Photoelectric effect

**AD-622 658 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**NOTE ON THE POTENTIALITIES OF CUMULONIMBUS AND HURRICANE SEEDING EXPERIMENTS, COMMENTS,**
by Louis J. Battan. 29 Dec 64, 2p. Rept. no. 155
Unclassified report

Pub. in Journal of Applied Meteorology v4 n3 p426-7 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Artificial precipitation, Storms), (*Tropical cyclones, Artificial precipitation), (*Cumulonimbus clouds, Artificial precipitation), Silver compounds, Iodides, Injection, Clouds, Nucleation, Atmospheric condensation, Feasibility studies

**AD-622 667 Div. 2/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**A CATALOGUE OF ARCAS-ROBIN SOUNDINGS.**
Environmental research papers,
by Robert W. Lenhard, and Arthur J. Kantor. Jun 65, 25p. Rept. no. AFCRL-65-449 ,ERP-113
Proj. 6682 Task 668203
Unclassified report

Descriptors: (*Atmospheric sounding, Upper atmosphere), (*Sounding rockets, Atmospheric sounding), (*Upper atmosphere, Atmospheric sounding), Meteorological parameters, New Mexico, Virginia, Florida, Catalogs

The data for 188 ARCAS-ROBIN rocket flights are described. Meteorological data for Holloman AFB in New Mexico, Wallops Station in Virginia, and Eglin AFB in Florida are available to a height of approximately 70 km for soundings taken between 11 October 1960 and 12 October 1962. (Author)

**AD-622 678 Div. 2/7 ,8/6**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**MULTIPLE SCATTER EFFECTS ON THE RADAR RETURN FROM LARGE HAIL.**
Revised ed.,
by Benjamin M. Herman. 20 Nov 64, 11p. Rept. no. 147
Unclassified report

Pub. in Journal of Geophysical Research v70 n5 p1215-25 Mar 1 1965 (Copies not available to DDC or Clearinghouse customers). Research supported by Office of Naval Research. Revision of manuscript received 2 Jul 64.

Descriptors: (*Radar echo areas, Hail), (*Hail, Radar echo areas), Spheres, Electromagnetic wave reflections, Configuration, Particle size, Correlation techniques

A modified form of the equation of radiative transfer is solved numerically in order to estimate the effects of multiple scattering on the backscattered radar signal. The returned signal from a hypothetical hailstorm composed of spherical hailstones of approximately 3-cm diameter is computed by means of the transfer equation, and the result is compared with that computed for the same storm but utilizing the conventional equation which neglects all multiple scattering. Results for optical depth tau = 0.48 show that multiple scattering effects enhance the backscattered signal by about 30%. This correction increases with optical depth, and for the larger hailstorms is probably quite significant. (Author)

**AD-622 679 Div. 2/7 ,4/2**
*OREGON STATE UNIV CORVALLIS DEPT OF OCEANOGRAPHY*
**GAS CHROMATOGRAPHIC DETERMINATION OF DISSOLVED OXYGEN IN SEA WATER USING ARGON AS CARRIER GAS,**
by Kilho Park, and Magdalena Catalfomo. 8 Jun 64, 5p. Contract Nonr128610 ,Grant NSF GP2232 Proj. NR083 102
Unclassified report

Pub. in Deep-Sea Research and Oceanographic Abstracts v11 p917-20 1964 (Copies available only to DDC users).

Descriptors: (*Oxygen, Seawater), (*Seawater, Oxygen), (*Chromatographic analysis, Sea water), Gas analysis, Argon, Oceanology

A modification of the gas chromatographic method of Swinnerton, Linnenbom, and Cheek for the determination of dissolved oxygen in sea water is presented. Argon is used as the carrier gas. Relative standard deviation obtained by the modified method is = 1.4 per cent for surface sea water samples. One analysis takes four minutes. (Author)

**AD-622 680 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**SATURATION VAPOR PRESSURES OVER SUPERCOOLED WATER,**
by J. E. McDonald. 14 Dec 64, 2p. Rept. no. 149
Unclassified report

Pub. in Journal of Geophysical Research v70 n6 p1553-4 Mar 15 1965 (Copies not available to DDC or Clearinghouse customers). Research supported by Office of Naval Research.

Descriptors: (*Vapor pressure, Atmospheric condensation), (*Nucleation, Clouds), (*Meteorological parameters, Phase studies), Supercooling, Water, Thermodynamics, Atmosphere

**AD-622 681 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**A MICROBAROPHONE FOR DUST DEVIL PRESSURE MEASUREMENTS,**
by Peter C. Sinclair. 16 Sep 64, 7p.
Unclassified report

Pub. in Journal of Applied Meteorology v4 n1 p11621 Feb 1965 (Copies not available to DDC or Clearinghouse customers). Research supported by Office of Naval Research.

Descriptors: (*Dust storms, Microbarometric waves), (*Microbarometric waves, Dust storms), (*Pressure gages, Meteorological instruments), Vortices, Wind, Sand, Storms, Deserts, Barometric pressure, Oscillation, Measurement, Transducers

The design and construction of a small, highly responsive pressure instrument with a sensitivity of approximately 0.1 mb is discussed. Two pressure sensors, or microbarophones, were used on a mobile tower to measure pressure variations near and within several dust devils. A pressure trace of a dust devil penetration is presented. The microbarophone is considered to have sufficient merit that it may be of use in other applications involving micro-pressure measurements. (Author)

**AD-622 705 Div. 2/7**
*NORTHEASTERN UNIV BOSTON MASS*
**ROCKET OPTICAL OBSERVATION OF A DAYTIME AURORA.**
Environmental research papers,
by S. M. Silverman, John W. F. Lloyd, B. L. Cochrun, and L. J. Nardone. Jul 65, 13p. Contract AF19 628 3876 Proj. 7661 Task 766101
AFCRL, 65-474
Unclassified report

Pub. in Nature v204 n4957 p461-2 Oct 31 1964 (Copies available only to DDC users).

Descriptors: (*Aurorae, Optical analysis), Sounding rockets, Optical scanning, Sky brightness, Spectrum analyzers, Meteorological phenomena, Optical properties, Atmospheric sounding

The preliminary results of a rocket optical observation of a day-time auroral event at Fort Churchill are reported. The variation with height of the intensity of the two lines 5577 A (OI) and 4278 A N2 (+) are given and compared with a similar measurement of 5577 A line in the day airglow at White Sands. (Author)

**AD-622 706 Div. 2/7**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS AEROSPACE INSTRUMENTATION LAB*
**A NOTE ON DENSITY VARIABILITY AT CONSTANT ALTITUDE VS. CONSTANT PRESSURE.**
Environmental research papers,
by P. Nee, A. E. Cole, I. I. Gringorten, and N. Sissenwine. Aug 65, 15p. Rept. no. ERP-128
Proj. 8624 Task 862401
AFCRL, 65-631
Unclassified report

Pub. in Journal of Applied Meteorology v4 n2 p3004 Apr 2 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atmosphere, Density), (*Density, Atmosphere), Atmospheric sounding, Meteorological parameters, Correlation techniques

Vertical profiles of density variability at constant height and nearby constant pressure surfaces are compared. Variability of density at a constant pressure surface is greater below and smaller above 8 to 10 km than variability at constant height. It is concluded that density variability at constant pressure is a poor indicator of density variability at constant height, except near the 8-km isopycnic level. (Author)

**AD-622 711 Div. 2/7**
**CFSTI Prices: HC $5.00 MF $1.00**
*UNITED AIRCRAFT CORP EAST HARTFORD CONN*
**TECHNIQUES FOR OBJECTIVE HEMISPHERIC ANALYSIS AND PREDICTION OF THE JET STREAM.**
Final rept. for 1 Oct 64-31 Jul 65,
by David B. Spiegler, John T. Ball, Robert J. Ball, and Bernard J. Erickson. Sep 65, 168p. Contract AF19 628 3437 Proj. 20 Task 23
ESD, TR-65-13
Unclassified report

Subcontracted to Travelers Research Center, Inc., Hartford, Conn., rept. no. 7463-176. Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white only.

Descriptors: (*Jet streams (Meteorology), Mathematical prediction), (*Air mass analysis, Numerical methods and procedures), (*Weather forecasting, Air mass analysis), Wind, Turbulence, Northern Hemisphere, Statistical analysis, Programming (Computers)

The objective hemispheric analysis technique incorporates information from data areas into level of maximum wind (LMW) analyses for no-data areas. This is done in a quantitative, objective, and consistent manner by using LMW regression equations that specify the initial-guess fields for the analysis. The analysis technique locates jet cores between grid points, and generates observations along these cores by using horizontal jet profiles. This technique produces high-quality analyses that compare favorably with subjective analyses, and that are generally consistent with one another. The first prediction technique is based on a procedure wherein potential predictors are obtained from a network grid oriented with respect to the LMW wind direction at the predictand point. Prediction equations are obtained by applying the screening regression technique to predictors selected from initial-state LMW parameters (and their 12-hr change) and wind speed values at constant pressure surfaces. Tests on independent data showed that these equations produce prognoses that are better than persistence for all polar and subtropical jetstream categories. The second prediction technique applies diagnostic LMW regression equations (originally derived to produce the initial-guess fields in the LMW analysis) to constant-pressure-surface numerical prognoses. (Author)

**AD-622 712 Div. 2/7 ,2/10 ,30/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*HAWAII INST OF GEOPHYSICS HONOLULU*
**SPECTRAL ANALYSIS OF TSUNAMI RECORDS FROM STATIONS IN THE HAWAIIAN ISLANDS,**
by Harold B. Loomis. Jun 65, 34p. Rept. no. HIG-65-8
Contract Nonr374803 Proj. NR083 168
Unclassified report

Descriptors: (*Earthquakes, Water waves), (*Tides, Earthquakes), (*Ocean waves, Earthquakes), (*Marine geophysics, Data processing systems), Hydrodynamics, Oceanographic data, Pacific Ocean, Hawaii, Midway, Mathematical analysis, Digital computers

Power spectra of wave records of recent tsunamis as recorded at several stations in Hawaii and Midway are calculated digitally. The power spectra are examined to find characteristics special to a given station and common to nearby stations. Energy decay curves are calculated and discussed. (Author)

**AD-622 717 Div. 2/7 ,25/3 ,30/3**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**A NEW DEVICE FOR THE MEASUREMENT OF STATIC ELECTRIC FIELDS.**
Revised ed.,
by W. H. Evans. 19 May 65, 5p. Rept. no. 159
Contract NSF GP800
Unclassified report

Pub. in Journal of Geophysical Research v70 n16 p3861-5 15 Aug 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 3 Apr 65.

Descriptors: (*Static electricity, Electric fields), (*Electric fields, Measuring devices (Electrical + electronics)), (*Atmospheric electricity, Measuring devices (Electrical + electronics)), (*Measuring devices (Electrical + Electronic), Atmospheric electricity), Integrators, Amplifiers, Probes (Electromagnetic)

The operational amplifier integrator has been adapted to the measurement of static and slowly varying electric fields. The instrument is intended for use inside and near thunderclouds; however, the design can be modified to accommodate essentially the entire VLF region to 30 kc/s. The basic principle involves detecting the derivative of the electric field and integrating the result. If the probe is connected to the input terminal of a high-gain amplifier integrator, it can be kept within a millivolt of ground potential. Since the probe is essentially at ground potential, its resistance-to-ground problems are greatly reduced. Also, the current from the probe into the integrator input is directly proportional to the derivative of the electric field, which means that the integrator output is directly proportional to the electric field. The integrator must be initially reset under zero field conditions. (Author)

**AD-622 725 Div. 2/7 ,25/3 ,30/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*AVCO EVERETT RESEARCH LAB EVERETT MASS*
**LABORATORY SIMULATION OF SOLAR WIND PHENOMENA.**
Research rept.,
by R. M. Patrick, and E. R. Pugh. Oct 65, 33p. Rept. no. RR-234
Contract AF49 638 1483 ,NASw837
Unclassified report

Descriptors: (*Solar wind, Simulation), (*Magnetohydrodynamics, Upper atmosphere), (*Upper atmosphere, Magnetohydrodynamics), Terrestrial magnetism, Plasma physics, Wind tunnels, Experimental data

The IMP Satellite magnetic field measurements in the vicinity of the earth's magnetopause has shown that there is a standing shock between the

earth's magnetic field and the solar wind, and a flow between the shock and the magnetosphere which is like a continuum flow. A theory which describes the boundary between this flow and the magnetosphere has been developed which shows that the diffusion of the magnetic field lines associated with the solar wind into the earth's magnetosphere can be much larger than previously expected. This has generated an interest in this Laboratory to build a facility which produces a steady flow of high conductivity, collision-free plasma with a characteristic flow dimension large compared to the ion gyro radii. A description of this facility and the design criteria will be given. The results of the calculation of the plasma flow in the field annihilation region between the solar wind and the magnetopause will be briefly reviewed, and the most recent experimental results obtained in the plasma wind tunnel facility will be given. (Author)

**AD-622 731 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**SOME FACTORS GOVERNING PRECIPITATION AND LIGHTNING FROM CONVECTIVE CLOUDS,**
by Louis J. Battan. 11 Aug 64, 6p. Rept. no. 150
Contract NSF G8216
Unclassified report

Pub. in Journal of Atmospheric Sciences v22 n1 p79-84 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lightning, Clouds), (*Rainfall, Clouds), (*Clouds, Rainfall), Meteorological phenomena, Atmospheric electricity, Electric discharges, Cloud cover, Artificial precipitation

Two groups of days, one with 'heavy rain' and one with 'light rain,' have been studied, Radar observations, cloud photographs and visual counts of cloud-to-ground lightning were examined. It is concluded that, at least in convective clouds in southeastern Arizona and probably in convective clouds in other geographical regions as well, the microphysical properties of the clouds are not of dominant importance in determining how much precipitation reaches the ground. It is inferred that the quantity of rainfall is mostly governed by those properties of the atmosphere which determine the size, strength and duration of the updrafts. The observations also show that as the quantity of rainfall increases so does the frequency of cloud-to-ground lightning. (Author)

**AD-622 732 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**A VIEW OF CLOUD PHYSICS AND WEATHER MODIFICATION IN THE SOVIET UNION,**
by Louis J. Battan. 1965, 8p. Rept. no. 156
Unclassified report

Pub. in Bulletin of the American Meteorological Society v46 n6 p309-16 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Meteorology, USSR), Clouds, Artificial precipitation, Meteorological radar, Weather forecasting

**AD-622 733 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**ON THE ROTATION OF DUST DEVILS,**
by Peter C. Sinclair. 1965, 4p. Rept. no. 157
Unclassified report

Pub. in Bulletin of the American Meteorological Society v46 n7 p388-91 1965 (Copies not available to DDC or Clearinghouse customers). Work supported by Office of Naval Research.

Descriptors: (*Dust, Storms), (*Sand, Storms), (*Air mass analysis, Storms), Deserts, Wind, Rotation, Vortices, Meteorology

A number of authors have, in the past, been of the opinion that dust devil direction of rotation is controlled by the earth's rotation. While this contention can be easily attacked through theoretical arguments, actual observations become the deciding factor. The observations presented, believed to be the largest collection on record, show quite conclusively that dust devils in general have no preferred direction of rotation. (Author)

**AD-622 735 Div. 2/3 ,25/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**THE PHOTOGRAPHIC SPECTRUM OF LIGHTNING: DETERMINATIONS OF CHANNEL TEMPERATURE FROM SLITLESS SPECTRA,**
by Leon E. Salanave. 1965, 13p. Rept. no. 154
Unclassified report

Pub. in Problems of Atmospheric and Space Electricity v4 p371-83 1965 (Copies available only to DDC users).

Descriptors: (*Lightning, Spectra (Visible; ultraviolet)), (*Spectra (Visible + ultraviolet), Lightning), Excitation, Temperature, Line spectrum, Photographic analysis, Nitrogen, Oxygen, Hydrogen

Investigations of the optical spectrum of lightning from 1901-1963 are reviewed. The advantages of slitless spectroscopy are emphasized, and detailed analyses of lightning based on new observations at Tuscon are presented. Criteria for qualitative estimates of relative levels of excitation from flash to flash are given. New measurements of excitation temperature (based on relative intensities of N II multiplets) lead to channel temperatures of 24,000-28,000 K, with standard errors on the order of 500 K. Previous uncertainties about the presence of emission lines due to N III or O III are resolved in the negative. The prominence of the H alpha emission line is noted, and its prospective utility for daylight detection and photography of lightning is suggested. A number of unsolved problems in the spectroscopy of lightning are outlined. (Author)

**AD-622 737 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**RADIATIVE COOLING IN THE VICINITY OF INVERSIONS AND THE TROPOPAUSE,**
by D. O. Staley. 15 Mar 65, 20p. Rept. no. 158
Contract Nonr217302
Unclassified report

Pub. in Quarterly Journal of the Royal Meteorlogical Society v91 n389 p282-301 Jul 1965 (Copies available only to DDC users).

Descriptors: (*Temperature inversion, Troposphere), (*Troposphere, Temperature inversion), (*Heat transfer, Troposphere), Atmosphere, Thermal properties, Humidity, Measurement, Radiosondes, Meteorology

The distribution of radiative cooling in the vicinity of a temperature inversion in the middle troposphere is calculated for several distributions of humidity. When mixing ratios are high throughout the inversion radiative cooling acts to erode the inversion (minimum cooling at the base, maximum cooling at the top). When mixing ratio decreases rapidly upward from the inversion base most of the inversion is a region of reduced cooling, while maximum cooling amounting to several degrees per day occurs in the vicinity of the inversion base. The region immediately below the inversion base is subject to strong radiative destabilization. Verification of the theoretical cooling rates is sought in ten radiometer-sonde ascents at Tucson, Arizona. The radiometer-sonde is only marginally applicable to determining the radiative cooling distribution in the vicinity of the inversions, and random radiometersonde errors and consequences of slant ascent are examined in detail. The radiometersonde measurements, when averaged, verify that radiative cooling is so distributed as to tend to maintain the inversion, showing maximum cooling of the order of 2C/day at and below the base and minimum cooling of the order of 1C/day in the upper part of the inversion. No verification was found for the theoretical destabilization of the layer below the inversion base, although errors and scatter of measurements obscure the true distribution. All ten radiometersonde ascents also penetrated the tropopause, and warming or minimum cooling was found at or very near the tropopause in every ascent. Hence the tropopause must be maintained by processes other than radiation. (Author)

**AD-622 755 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**WIND AND TEMPERATURE REPRESENTATIONS IN THE 26-MONTH OSCILLATION,**
by D. O. Staley. 1965, 2p. Rept. no. 152
Unclassified report

Pub. in Nature v206 n4980 p177 10 Apr 1965 (Copies available only to DDC users).

Descriptors: (*Atmospheric motion, Meteorological parameters), (*Meteorology, Atmospheric motion), Wind, Atmospheric temperature, Atmospheric tides, Climatology

The purpose of this communication is to present an analytical expression for the zonal wind oscillation which accurately describes the observations and which, through the thermal wind equation, also leads to an accurate analytical expression for the temperature oscillation. These expressions should prove useful in theoretical investigations of the oscillation.

**AD-622 792 Div. 2/7**
**CFSTI Prices: HC $3.00 MF $0.75**
*MCGILL UNIV MONTREAL (QUEBEC) STORMY WEATHER GROUP*
**ALBERTA HAIL STUDIES 1964.**
Scientific rept.,
by J. F. Derome, R. H. Douglas, W. Hitschfeld, and M. Stauder. Jul 65, 79p. Rept. no. SR-6, MW-42
Contract AF19 628 249 Proj. 8620 Task 862009
AFCRL , 65-600
Unclassified report

Descriptors: (*Hail, Atmospheric motion), (*Wind, Hail), Convection, Canada, Physical properties, Phase studies, Thermodynamics, Heat transfer, Cooling, Alberta

The three-dimensional patterns of the large-scale divergence and vertical motion over North America are derived at twelve-hour intervals for a one-week period beginning May 21, 1962. The distribution of severe storms in the central and eastern United States during that period is examined and related to the patterns of vertical motion. The mean profile of large-scale vertical motion near early-morning storms is compared with the near late-afternoon storms; the two profiles are found to be quite different. The morning storms correlate highly with the patterns of upward motion; the afternoon storms do not, presumably because other factors such as local heating are of comparable importance. (Author)

**AD-622 849 Div. 2/7 ,25/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C*
**OPTICS OF THE EARTH'S ATMOSPHERE AND TURBID MEDIA: COMPILATION OF ABSTRACTS.**
Rept. no. 1,
by Yuri Ksander. 12 Oct 65, 84p. Rept. no. ATD-P-65-66
TT , 65-64251
Unclassified report

Open-source research papers for the period 1954-1964. Rept. on Surveys of Communist World Scientific and Technical Literature.

Descriptors: (*Optics, Atmosphere), (*Atmosphere, Optical properties), Infrared radiation, Light, Scattering, Aerosols, Fog, Haze, Sky brightness, Twilight, USSR, Abstracting, Reviews

This report consists of abstracts of Soviet open-source research papers on optical radiation transfer models and the optical properties of the atmosphere. Generally, retrieval of articles was for the period from 1954 to 1964, although several papers published in 1965 also appear in the report.

**AD-622 890 Div. 2/7 ,25/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C*
**ATTENUATION OF VISIBLE AND INFRARED RADIATION BY ARTIFICIAL WATER FOGS (OSLABLENIE VIDIMOI I INFRAKRASNOI RADIATSII VODNYMI ISKUSTVENNYMI TUMANAMI),**
by V. E. Zuyev, B. P. Koshevev, S. D. Tvorogov, and S. S. Khmelevetsov. 20 Oct 65, 13p. Rept. no. ATD-T-65-87
TT , 65-64252
Unclassified report

Trans. of Akademiya Nauk SSSR. Izvestiya. Fizika Atmosfery i Okeana. Moscow, v1 n5 p590-16 1965.

Descriptors: (*Fog, Optical properties), Electromagnetic waves, Propagation, Light, Infrared radiation, Attenuation, Aerosols, Water vapor, Optics, USSR

The results of theoretical and experimental studies of the optical and microphysical properties of artificial fogs are discussed. Quantitative data on the attenuation of infrared radiation in fogs obtained by taking into account polydispersion and absorption in water droplets are compared with results of experimental determinations of the spectral transmittance of fogs. (Author)

**AD-622 894 Div. 2/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**LIGHTNING PHOTOGRAPHY AND COUNTING IN DAYLIGHT, USING H ALPHA EMISSION,**
by Leon E. Salanave, and Marx Brook. 21 Nov 64, 5p. Rept. no. reprint no. 148
Contract Nonr217306
Unclassified report

Pub. in Journal of Geophysical Research v70 n6 p12859 Mar 15 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with New Mexico Inst. of Mining and Technology, Socorro Contract Nonr81503.

Descriptors: (*Lightning, Photographic analysis), Meteorological phenomena, Atmospheric electricity, Electric discharges, Counting methods, Optical properties, Hydrogen, Spectroscopy, Photographic techniques

Narrow-band interference filters having a bandpass centered at H alpha (lambda = 6563A) have been used successfully in photographing lightning discharges in daylight and in the design of an improved lightning flash counter. Preliminary results are presented along with a discussion of design principles and possible further applications of the techniques. (Author)

**AD-622 898 Div. 2/7 ,2/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C*
**MEASUREMENT OF ELECTRON CONCENTRATION IN THE UPPER IONOSPHERE BY THE COSMOS ARTIFICIAL EARTH SATELLITES.**
ATD Work Assignment no. 79,
by Daniel Wolkonski. 26 Oct 65, 14p. Rept. no. ATD-T-65-93
TT , 65-64254
Unclassified report

Trans. of Kosmicheskie Issledovaniya (USSR) v3 n4 p595-603 1965. Translations of Soviet Scientific and Technical Literature.

Descriptors: (*Atmospheric sounding, Satellites (Artificial)), (*Electron density, Ionosphere), (*Ionosphere, Electron density), (*Satellites (Artificial), Atmospheric sounding), Space environmental conditions, Telemeter systems, USSR

One of the formulas serving to determine the electron concentration of the ionosphere is presented. The refractive index of the ionosphere depends on three coordinates and time. The formula is derived on the basis of measurements of the phase difference of coherent radio waves radiated by transmitters installed on satellites and rockets. The results of such measurements obtained by utilizing the radiation of the Mayak radio transmitter on board artificial earth satellite Cosmos-11 are discussed. A nonmonotonic curve of electron concentration along the orbit above the main ionization peak is detected. The hypothesis of a 'compression' of the upper ionosphere during the transition from maximum to minimum solar activity is confirmed. A maximum is detected at 150-180 km in the spectrum of the dimensions of the inhomogeneities of the outer ionosphere. The irregular slopes of electron concentration in large inhomogeneities attain tens of percent in relation to the regular value of N. (Author)

**AD-622 899 7iv. 2/7**
**CFSTI Prices: HC $5.00 MF $1.00**
*PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF METEOROLOGY*
**FLUX OF HEAT AND MOMENTUM IN THE PLANETARY BOUNDARY LAYER OF THE ATMOSPHERE.**
Final rept. for 1 Apr-30 Jun 65,
by Alfred K. Blackadar, Hans A. Panofsky, Stephen Berman, Jason K. S. Ching, and G. Dale Hess. 31 Jul 65, 156p. Contract AF19 604 6641 Proj. 8604 Task 860401
AFCRL , 65-531
Unclassified report

Descriptors: (*Atmospheric motion, Boundary layer), (*Boundary layer, Atmospheric motion), Wind, Heat transfer, Momentum, Energy, Atmospheric temperature, Meteorological parameters

A single-layer theory is presented for the wind distribution in baroclinic neutral and unstable boundary layers. The theory predicts the stress of the wind on the ground from large scale geophysical parameters. A re-analysis of observations made by Swinbank confirms the validity of the Keyps wind profile theory. The effects of a change of roughness on the wind profile have been extended to diabatic surface layers. Also a study of the turbulent energy budget showed significant differences between the rate of production and rate of dissipation in the vicinity of a large change of terrain roughness. A graphical procedure for estimating the spectrum of the longitudinal wind component from the height, mean wind speed, surface roughness, and stability has been developed from observed spectra at many locations. (Author)

**AD-622 986 Div. 2/3 ,2/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**CLIMATE AND THE HEAT BUDGET OF THE CENTRAL ARCTIC,**
by J. O. Fletcher. Oct 65, 23p. Rept. no. P-3250
Unclassified report

Descriptors: (*Climatology, Arctic regions), (*Arctic regions, Climatology), Atmosphere, Arctic Ocean, Ice islands, Thermal properties, Marine meteorology

A detailed assessment is presented of each component of the heat budgets for the surface and for the earth-atmosphere system in the central Arctic, for both an icecovered and an ice-free ocean. These estimates suggest that the annual heat balance at the surface for an icefree Arctic would be near zero rather than strongly positive as suggested by Donn and Shaw. The sources of this discrepancy are identified and discussed. The annual patterns of atmospheric cooling for both present and icefree conditions are obtained as residuals. The relation of these patterns to general atmospheric circulation and glacier accumulation is discussed, with the conclusion that an open Arctic Ocean would be conducive to glacier accumulation in Canada and Scandinavia. (Author)

**AD-623 003 Div. 2/7**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**NEW EFFECTS IN CLOUD PHYSICS.**
Rept. for Dec 62-Jun 63,
by Albert Pfeiffer. Sep 65, 29p. Rept. no. CRDLR-3312
Task 1C522301A06001
Unclassified report

Descriptors: (*Clouds, Physics), (*Meteorology, Clouds), Atmosphere, Phase studies, Fluid mechanics, Smokes, Carbon dioxide, Bubbles, Aerosols, Diffusion

Unique experiments are described showing: (1) an apparently paradoxical behavior in the rising of gas bubbles in smoke and in the subsidence of miniature smoke clouds in a gaseous atmosphere, and (2) the movement of the aerosol particles of a cloud from the gaseous boundary of the cloud into the cloud. It is concluded that: (1) An unexplained force probably attracts the aerosol particles in an aerosol cloud. (2) The observed, apparently paradoxical, behavior of the aerosol cloud is caused by an ordinary, diffusional exchange of gas molecules between the cloud and the adjacent gas. (Author)

**AD-623 018 Div. 2/7**
**CFSTI Prices: HC $6.00 MF $1.50**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS METEOROLOGY LAB*
**OZONESONDE OBSERVATIONS OVER NORTH AMERICA, VOLUME 3.**
Environmental research papers,
by Wayne S. Hering, and Thomas R. Borden,Jr.,
Aug 65, 273p. Rept. no. ERP-133
Proj. 8631 Task 863102
AFCRL , 64-30V3
Unclassified report

See also AD-604 880.

Descriptors: (*Atmospheric sounding, Ozone), (*Ozone, Atmosphere), Weather stations, North America, Radiosonde, Telemetering data, Meteorology, Graphics

An experimental program for the measurement of the vertical ozone distribution was initiated by the Air Force Cambridge Research Laboratories in January 1963. A network of eleven ozonesonde stations was established in North America to provide high resolution observations of the vertical ozone distribution for a variety of research purposes. The resultant data are being published in a series of reports. The first volume (AD-435 873) contained the ozonesonde and associated radiosonde observations for the months of December 1962 through March 1963. The second volume (AD-604 880) contained the ozonesonde and associated radiosonde observations for the months of April-through August 1963. Also included in Vo-

lume 2 were the average distributions of ozone over the North American continent as derived from the network observations. Data averages for overlapping bimonthly periods were presented for January-February through July-August 1963. This third volume presents the ozonesonde and radiosonde data for the months of September 1963 through August 1964. (Author)

**AD-623 031 Div. 2/7**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**STRUCTURE AND VARIATION OF THE TOPSIDE IONOSPHERE CLOSE TO THE FORT MONMOUTH LONGITUDE.**
Revised ed.,
by P. R. Arendt, and A. Papayoanou. 15 Apr 65, 11p.

Unclassified report

Pub. in Journal of Geophysical Research v70 n15 p3675-85 Aug 1 1965 (Copies not available to DDC or Clearnighouse customers.) Revision of manuscript submitted 14 Jan 65.

Descriptors: (*Atmospheric sounding, Ionosphere), (*Ionosphere, Atmospheric sounding), Satellites (Artificial), Instrumentation, Electron density, Plasma physics, Magnetic storms

Ionograms of the topside ionosphere obtained from the Alouette satellite during a period of more than a year have been reduced to 'real height' profiles. Data obtained between September 1963 and January 1964 have been studied in detail. The effective radio horizon of Fort Monmouth enables a study of the upper ionosphere between 15 and 65 deg. N deg. geographic latitude and 50 and 100 deg W longitude. Curves of plasma frequencies and of electron density at fixed altitudes have been prepared as a function of latitude, longitude, and time of day. Special attention has been given to the effects of magnetic disturbances as revealed on the contours. During the observed magnetic storms, the measured altitudes for specific plasma frequencies were decreased by more than 200 km. Another parameter, the integrated electron content in the topside ionosphere, has been compared with f sub o F sub 2. The assistance of five bottomside sounding stations located within the radio horizon of Fort Monmouth and computer programs for reducing topside and bottomside ionograms to real height profiles made it possible to study the difficulties in matching topside and bottomside profiles. Many topside and bottomside profiles have been found to match closely when the observed f sub o F sub 2 values of topside and bottomside ionograms differ by not more than 0.3 Mc/s. Matching was observed for differences of 1 to 2 deg of the geographic positions of the ground station and the subsatellite point. (Author)

**AD-622 365 See Fld. 20/4**

**AD-622 422 See Fld. 8/14**

**AD-622 506 See Fld. 8/10**

**AD-622 635 See Fld. 5/1**

**AD-622 861 See Fld. 1/2**

**AD-623 027 See Fld. 12/1**

**AD-623 034 See Fld. 19/5**

## 5/1. ADMINISTRATION AND MANAGEMENT

**AD-622 417 Div. 26/2 ,30/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**AN INTRODUCTION TO SYSTEM EFFECTIVENESS,**
by H. S. Dordick. Oct 65, 9p. Rept. no. P-3237

Unclassified report

Descriptors: (*Management engineering, Systems engineering), (*Systems engineering, Management engineering), Reliability, Maintenance, Designs, Costs, Management planning

The paper is an introduction to a working session on 'system effectiveness', defined by the office of Naval Material as 'a measure of the extent to which a system can be expected to complete its assigned mission within an estimated time frame under stated environmental conditions.' For systems effectiveness, not only must reliability and maintainability parameters be considered, but each of these must be traded off with performance criteria. Defining effectiveness measures for the designer shifts from the research-orientation of looking for basic principles to techniques for organizing design performance, managing the design performance, and setting up a structure of project management within which the designer must work.

**AD-622 590 Div. 26/2 ,32/4**
*CALIFORNIA UNIV LOS ANGELES WESTERN MANAGEMENT SCIENCE INST*
**THE OPTIMAL MANAGEMENT POLICY OF AN INSURANCE COMPANY,**
by Karl Borch. 1965, 20p. Rept. no. WMSI-reprint-28
Proj. NR047 041

Unclassified report

Pub. in Proceedings of the Casualty Actuarial Society v51 May 1965 (Copies not available to DDC or Clearinghouse customers). Manuscript revision available from CFSTI HC$1.00, MF$0.50 as AD-607 800.

Descriptors: (*Management planning, Money), (*Probability, Management planning), (*Economics, Probability), Optimization, Mathematical models, Difference equations, Equations, Functions, Mathematical analysis, Operations research

The paper discusses decision problems that occur in insurance companies. It indicates how the problems may be solved by combining the familiar ideas of actuarial mathematics with those of modern theories of scientific management. In general, management has rules as to how the decisions should be made. These rules are referred to as the management policy of the company.

**AD-622 635 Div. 30/1 ,30/2 ,25/6 ,2/7 ,+**
**CFSTI Prices: HC $3.00 MF $0.50**
*AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C*
**FOREIGN SCIENCE BULLETIN, 1965, VOL. 1, NO. 10.**
Oct 65, 56p.
TT , 65-64245

Unclassified report

A monthly review of selected Foreign Scientific and Technical Literature sponsored by the Department of Defense. See also AD-619 249.

Descriptors: (*Scientific research, Reviews), Microminiaturization (Electronics), Computer storage devices, Semiconductors, Twilight, Heat-resistant plastics, Airships, Antenna configurations, Crystal structure, Lanthanum compounds, Tellurides, Glass textiles, Plastics, Reinforcing materials

Contents: A review is presented of a theoretical study on the feasibility of development of microminiature electronics components consisting of individual atoms and molecules; A new mechanism for indirect optical transitions in semiconductors is described in which emission or absorption of photons takes place as a result of interaction with free carriers; A proposal has been made that the hitherto ground-based technique of twilight sounding of the atmosphere be conducted from satellites as a means both of supplementing ground data and obtaining information on other planetary 'atmospheres; Continuation of studies in the field of network-structured silicones with heteroatoms introduced into the polymer, as well as further attempts in the study of polybenzimidazoles and polyoxazoles, are reported. A paper concerning the effect of polyconjugation on thermal stability is mentioned; Recent Soviet discussions on airships reflect renewed interest in the development of large dirigibles as a versatile, economical, and safe means of transportation; New compact antenna; Crystal structure of lanthanum ditelluride; and research in the field of oriented glass-reinforced plastics.

**AD-622 774 Div. 30/1 ,25/2 ,25/6 ,2/8 ,+**
**CFSTI Prices: HC $4.00 MF $0.75**
*BROWN UNIV PROVIDENCE R I*
**MATERIALS SCIENCES PROGRAM.**
Annual technical rept. no. 4, 1 Jul 64-30 Jun 65. 30 Jun 65, 105p. Contract SD86

Unclassified report

Descriptors: (*Scientific research, Materials), (*Materials, Scientific research), Elasticity, Fracture (Mechanics), Polymers, Glass, Crystal lattice defects, Stresses, Crystal structure, Magnetic resonance, Phase studies, Solids, Mechanics, Ceramic materials, Semiconductors, Stability, Geology, Cryogenics, Superconductivity, Solid state physics, Hydrodynamics

Fields of materials research at Brown University includes: Theoretical studies of mechanical behavior of elastic and viscoelastic materials; Experimental studies of nonlinear viscoelastic behavior and of fracture in polymers and glasses by stress wave loading; Studies of crystal defects, their origin and their interactions; Propagation of high-frequency stress waves in solids; Studies of structures and molecular forces in crystals by spectroscopy from xray to sub-audio frequencies; Electron and nuclear spin resonance studies of inorganic crystals and complexes; Phase transitions and rate processes in polymers and glasses from molecular theory and experiment; Studies in mechanics of solids ranging from response of structural elements to macroscopic evaluation of microscopic behavior; Physical metallurgy and corresponding studies of ionic crystals and ceramics; Electrical properties of semiconductors especially as affected by radiation; Deformation of isotropic materials, crystals, and aggregates under geological conditions and in model systems; Stability of crystalline materials in relation to temperature, pressure and chemical composition, and as affected by ion exchange and gaseous diffusion; Properties of matter at a very low temperatures; theory of superconductivity and related many-body problems; Surface state physics and electron microscopy; Paramagnetic resonance in solids, acoustic and hydrodynamic studies of solids and liquid metals.

**AD-622 676 See Fld. 9/2**

**AD-622 766 See Fld. 15/5**

**AD-622 835 See Fld. 5/9**

## 5/2. DOCUMENTATION AND INFORMATION TECHNOLOGY

**AD-622 560 Div. 32/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*HUGHES AIRCRAFT CO CULVER CITY CALIF SERVICES DIV*
**INFORMATION ACTIVITIES.**
Technical memo.,
by K. C. Rosenberg. Aug 65, 8p. Rept. no. TM-833

Unclassified report

Descriptors: (*Libraries, Information retrieval), (*Information retrieval, Libraries), Department of Defense, Scientific organizations, Reports, Documentation

Contents: Library of Congress, Department of Defense, Atomic Energy Commission, Clearinghouse for Federal Scientific and Technical Information of the United States Department of Commerce, National Aeronautics and Space Administration, and library facilities in the Los Angeles Area.

**AD-622 944 Div. 32/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*OFFICE OF AEROSPACE RESEARCH WASHINGTON D C OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION*
**SUGGESTED CRITERIA FOR TITLES, ABSTRACTS, AND INDEX TERMS IN DOD TECHNICAL REPORTS,**
by Alexander G. Hoshovsky. Oct 65, 25p.
OAR , 65-9
Unclassified report

Descriptors: (*Reports, Documentation), (*Documentation, Standards), Subject indexing, Abstracting, Department of Defense, Research program administration, Automation, Information retrieval

The DOD requires that its authors completed DD Form 1473 (a bibliographic control form) on all DOD technical reports. This requirement should be, but is not now, accompanied by a set of criteria for the preparation of titles, abstracts and keywords. The titles should be definitive, subject encompassing, and composed from specific terms. Superfluous phrases, superscripts and subscripts should be avoided. The abstracts should contain statements of purpose of the study, methodology used, give significant results, and interpret the meaning of the study; they should act as a substitute for the whole report. Index-terms should be those which describe the materials, equipment or systems used in the study; processes, techniques, or operations inherent in the study. They should contain both generic and specific expressions, as well as words which show relationship of the reported work to other disciplines. The use of links and roles (an optional DOD indexing requirement) is questioned because it requires a consistency in indexing, as well as different role-definitions in different document collection. The adoption of the proposed criteria should lead to a more meaningful author participation in the DOD documentation process. (Author)

## 5/3. ECONOMICS

**AD-622 765 Div. 32/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**AGGREGATIVE PRODUCTION FUNCTIONS AND ECONOMIC GROWTH POLICY,**
by Richard R. Nelson. Oct 65, 25p. Rept. no. P-3218
Unclassified report

Descriptors: (*Economics, United States), United States Government, Industrial production, Industries, Scientific research, Commerce

Contents (the guidance for U. S. economic growth policy that is provided by the present knowledge of the relationship between aggregative inputs and the production possibilities open to an economy): Uncertainties about the aggregate production function; scope of theory (the weak links to policy instruments and objectives); role of theory in growth policy; strategy of policy making in situations where knowledge is mostly qualitative; proposed industrial expansion service before the U. S. Congress.

**AD-622 793 Div. 32/4 ,26/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES*
**THE NONSUBSTITUTION AND NONSWITCHING THEOREMS IN A MODEL WITH FIXED CAPITAL.**
Technical rept.,
by Eytan Sheshinski, and Edwin Burmeister. 20 Aug 65, 26p. Rept. no. TR-135
Contract Nonr22550 Proj. NR047 004
Unclassified report

Descriptors: (*Model theory, Economics), (*Economics, Model theory), (*Industrial production, Model theory), Mathematical models, Management planning

Let a competitive economy produce commodities of varying durabilities, such that (a) production processes exhibit constant returns to scale; (b) there is one exogenous non-productible factor; (c) there are alternative techniques to produce each good; (d) it is possible to define conversion coefficients for old durable goods in terms of new goods of the same kind. Theorem: Let (A)- (d) hold. Then I: A long-run equilibrium of input-output coefficients and of prices in terms of wage units is uniquely determined for any preassigned value of the rate of interest. II: It is impossible to have identical techniques at different interest rates. This theorem generalizes Samuelson's static and dynamic nonsubstitution theorem. (Author)

**AD-622 871 Div. 32/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES*
**OPTIMAL ECONOMIC GROWTH AND WEALTH EFFECTS.**
Technical rept.,
by Mordecai Kurz. 18 Oct 65, 19p. Rept. no. TR-136
Contract Nonr22550 Proj. NR047 004
Unclassified report

Descriptors: (*Economics, Optimization), Mathematical models, Money, Labor, Consumption

The presence of wealth effects is shown to be a possible cause of the appearance of 'Saddle points' or multiple stationary solutions for the optimal path of economic growth. The importance of this fact is that it tends to narrow down the range of economic growth prescribed by the optimal path. This is so since starting from a fixed initial condition, and then having a multiplicity of stationary solutions may lead to the appearance of a relatively 'close' point towards which the optimal path converges.

**AD-622 590** **See Fld. 5/1**

## 5/4. HISTORY, LAW AND POLITICAL SCIENCE

**AD-622 364 Div. 32/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**THE SOVIET POLICY TOWARDS INDONESIA IN THE WEST IRIAN AND THE MALAYSIAN DISPUTES,**
by Nadia Derkach. Sep 65, 12p. Rept. no. P-3081-1
TT , 65-64154
Unclassified report

Descriptors: (*USSR, Foreign policy), (*Indonesia, Political science), Malaya, New Guinea, Communism, United States Government

Indonesians by their policy toward Malaysia presented the Soviets with hard choices. Soviet support of the Indonesian confrontation with Malaysia on the model of support in the West Irian dispute would have led to the following costs. It would have disturbed the detente with the United States (which did not exist earlier), and it would have foreclosed the possibility of useful Soviet relations with Malaysia in the future. Open opposition to the Indonesian policy would have proved the Chinese contention that the Soviet Union has no genuine interest in national liberationist movements and would have guaranteed Chinese dominant influence in Indonesia. The Soviets would have run counter to the policy of the Communist Party of Indonesia which has identified itself with the confrontation policy. The Soviets have adopted a compromise policy of grudging support for the Indonesians on the Malaysian issue.

**AD-622 421 Div. 32/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**SOME REGULARITIES IN INTERNATIONAL CONFLICT, 1820-1949,**
by F. H. Denton. Sep 65, 24p. Rept. no. P-3238
Unclassified report

Descriptors: (*Political science, Warfare), (*Warfare, History), Statistical analysis, Factor analysis, Social sciences, Economics, Culture, Government (Foreign)

The paper reports on an exploratory statistical analysis into what is essentially the domain of political science theory. The goal in this research was to detect and summarize regularities in the perceived 'causes' of large scale conflict between social groups (war) from 1820 to 1949. The approach was largely inductive in nature with only a loosely formed theory guiding the selection and analysis of the historical record on conflict during this time. In contrast to the historian who tends to look for the unique and uncommon, this research effort was guided by a desire to detect the common, the recurring aspects of large scale social violence.

**AD-622 939** **See Fld. 15/7**

## 5/6. HUMANITIES

**AD-622 387** **See Fld. 9/2**

## 5/7. LINGUISTICS

**AD-622 570 Div. 32/11,32/2 ,30/2**
**CFSTI Prices: HC $4.00 MF $0.75**
*IDAMI LANGUAGE RESEARCH SECTION MILAN (ITALY)*
**AUTOMATIC ENGLISH SENTENCE ANALYSIS.**
Final scientific rept. for 1 Mar 64-30 Jun 65. 30 Jun 65, 113p. Rept. no. ILRS-T-11 ,650630
Contract AF EOAR64 54 ,AF EOAR65 76
AFOSR , 65-1908
Unclassified report

See also AD-615 486, AD-617 793, AD-617 865.

Descriptors: (*Language, Analysis), Vocabulary, Automatic, Computer storage devices, Classification, Machine translation, Italy

Part I: The LINGUISTICS Group describes work on the Multistore Procedure for analysis of English sentences. Previous reports are given as abstracts and subsequent developments are described. Machine-economics have been introduced in various aspects of the procedure; the general table of correlators has been refined; a corpus of texts has been key-punched and processed to provide data for analysis of explicit correlators; this analysis is partly completed. The procedure for reclassification of intermediate products is described. Part II: The MATHEMATICS Group reports work on aspects of the structure of langu-

age. Considering the sentence as codification of thought, and thought as a complex of mental items between which certain relations hold, the report considers the source of these mental items, under three headings: (1) sense-perceptions, (2) reflections, (3) inter-personal communication. The structure of language is found to be characterized by the way in which relations between mental items are codified. (Author)

**AD-623 002 Div. 32/11,32/2 ,15/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*MICHIGAN UNIV ANN ARBOR COMMUNICATION SCIENCES PROGRAM*
**A HOMOMORPHIC THEORY OF CONTEXT-FREE LANGUAGES AND ITS GENERALIZATIONS.**
Technical rept.,
by Yehoshafat Give'on. Sep 65, 29p. Rept. no. 7363 ,03105-40-T
Contract Nonr122412 Grant ,DA ARO D31 124G665 Proj. ORA03105 ,ORA07363
Unclassified report

Descriptors: (*Language, Numerical analysis), Mapping (Transformations), Algebraic topology, Groups (Mathematics), Set theory, Monoids, Automata

Usually, and naturally, context-free languages are defined and studied by means of grammars. In the course of study of these languages several algebraic characterizations were found. In this paper one of these characterizations (namely, the homomorphic characterization that was established by Chomsky and Schutzenberger (N. Chomsky and G. A. Miller. 'Introduction to Formal Analysis of Natural Languages,' 'Handbook of Mathematical Psychology, ii, J. Wiley, p. 269-418, 1963)) is regarded as the definition of this family of languages and it is shown how one can derive some of their well known properties directly from this 'redefinition.' In addition to simplification of proofs, the arguments involved lead naturally to some generalizations that have some bearing on mathematical linguistics. The families of languages derived by means of these generalizations exhibit some features which are too complex for the context-free model and yet these features are of the type that one encounters in the study of natural languages. Examples of these generalizations are discussed. (Author)

## 5/9. PERSONNEL SELECTION, TRAINING AND EVALUATION

**AD-622 340 Div. 23/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*PERSONNEL RESEARCH LAB (6570TH) AEROSPACE MEDICAL DIV LACKLAND AFB TEX*
**A PRELIMINARY INVESTIGATION OF RATER DIFFERENCES IN OFFICER EFFECTIVENESS REPORTS,**
by Ernest C. Tupes, and Margorie N. Kaplan.
Jul 65, 15p. Rept. no. PRL-TR-65-13
Proj. 7719 Task 771904
Unclassified report

Descriptors: (*Officer personnel, Effectiveness), Air force personnel, Performance (Human), Attitudes, Statistical analysis, Reliability, Reports

A sample of 1,790 Air Force officers was identified, each of whom had rated at least 4 different officers during 1960-1961 on the Officer Effectiveness Report (OER). The mean OERs received by these same officers during the 1956-1959 period were used in connection with the 1960-1961 OER ratings to obtain 4 difference scores for each of the 1,790 raters, which were averaged to obtain an Average Difference Score. The reliability of the Average Difference Score was estimated, and it was used as a criterion to identify rater characteristics associated with the tendency to rate consistently high or low. The conclusions of the study were that rater differences on the OER did exist and that these were related to certain other characteristics of the raters. However, neither the differences nor the relationships were great enough in magnitude to be of practical value, and it was concluded that additional research on the study of rater differences in the OER rating system was unlikely to be fruitful. (Author)

**AD-622 433 Div. 23/1**
**CFSTI Prices: HC $4.00 MF $1.00**
*PERSONNEL RESEARCH LAB (6570TH) AEROSPACE MEDICAL DIV LACKLAND AFB TEX*
**IDENTIFICATION OF JOB TYPES IN THE PERSONNEL CAREER FIELD.**
Technical rept.,
by Joseph E. Morsh. Apr 65, 145p. Rept. no. PRL-TR-65-9
Proj. 7734 Task 773401
Unclassified report

Descriptors: (*Air force personnel, Job analysis), (*Job analysis, Air force personnel), Air force systems command, Personnel management, Classification, Data processing systems, Programming (Computers), Performance (Human)

A job inventory covering 11 specialties in the Personnel Career Field and consisting of 260 tasks grouped under 12 duty categories was administered by mail to 1647 airmen in 21 major commands. Incumbents of all skill levels, completed a background information sheet and rated on a 5-point scale the relative time spent on tasks. A computerized hierarchal grouping procedure applied to the time spent data was used to identify and describe 34 significant job types. Job types were found to cut across commands and to some extent across grades and AFSCs. Job types identified supported the present mechanized shredout and existing specialties in the Personnel Career Field. Task descriptions of jobs as performed by the several specialties and by groups with differing amounts of active federal service showed that the number and kinds of tasks performed and the time spent on them vary with incumbents' job type, grade, and experience. (Author)

**AD-622 473 Div. 23/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**THE TEACHER AND CYBERNETICS,**
by S. Efimov. 23 Sep 65, 10p. Rept. no. FTD-TT-65-1152
TT , 65-64196
Unclassified report

Unedited rough draft trans. from Komsomolskaya Pravda (USSR) 9 Oct p3 1962.

Descriptors: (*Education, Cybernetics), (*Teaching machines, Education), Training devices, Reasoning, Instructors, USSR

**AD-622 806 Div. 23/1 ,28/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*PERSONNEL RESEARCH LAB (6570TH) AEROSPACE MEDICAL DIV LACKLAND AFB TEX*
**OFFICER GRADE REQUIREMENTS PROJECT. I. OVERVIEW,**
by Raymond E. Christal. Sep 65, 56p. Rept. no. PRL-TR-65-15
Proj. 7734 Task 773402
Unclassified report

Descriptors: (*Air force personnel, Job analysis), (*Officer personnel, Job analysis), (*Job analysis, Military requirements), Personnel management, Analysis

The Officer Grade Requirement (OGR) Project was accomplished to determine the appropriate distribution of grades for Air Force officer positions. Descriptions were obtained for 79,750 officer jobs in grades lieutenant through colonel, and a subset of 3,575 descriptions was drawn from this file to serve as a 'criterion sample.' A special Hq USAF Policy Board, composed of 22 colonels, was called to determine the appropriate grade for each job in the criterion sample. Subsequent analyses revealed that (1) board members were confident in their grade ratings; (2) board members were not biased toward jobs in particular commands or specialties; (3) board members agreed with each other concerning the appropriate grade levels for particular jobs; and (4) board members did not give inflated ratings and did not simply confirm current UMD authorizations. Each job was rated on its own merits. Phase II of the OGR study involved expressing the policy of the Hq USAF board in the form of a mathematical equation which weights certain job requirement factors demonstrated to be relevant for grade determination. This equation was applied to determine the appropriate grade requirements for an additional 10,000 officer jobs. Results were then projected to determine the appropriate distribution of grades for various specialties and specialty groupings. (Author)

**AD-622 807 Div. 23/1 ,28/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*PERSONNEL RESEARCH LAB (6570TH) AEROSPACE MEDICAL DIV LACKLAND AFB TEX*
**DEVELOPMENT AND STANDARDIZATION OF AIRMAN QUALIFYING EXAMINATION -64,**
by Howard L. Madden, and William B. Lecznar.
Aug 65, 34p. Rept. no. PRL-TR-65-14
Proj. 7717 Task 771705
Unclassified report

Descriptors: (*Air force personnel, Selection), (*Psychometrics, Standardization), Aptitude tests, Air force training, Tables

The report describes the development and standardization of the 1964 form of the Airman Qualifying Examination (AQE-64) for use in the Air Force selective recruitment and high school testing programs. It was designed to parallel AQE-62, its immediate predecessor, and also to capitalize on research data that indicated the predictive efficiency of the aptitude composites could be increased through crediting completion of certain high school subjects. Standardization of AQE-64 was by the equipercentile method but norms were tied to Project TALENT samples of 1960 rather than the World War II mobilization population previously used. Complete statistical data on test items, composite score distributions, and intercorrelations for TALENT and AQE subtests are a part of the report. (Author)

**AD-622 817 Div. 23/4 ,18/1**
**CFSTI Prices: HC $6.00 MF $1.25**
*SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF*
**DEVELOPMENT OF OVERALL TRAINING PROGRAMS FOR CIVIL DEFENSE.**
Final rept. for 5 Nov 63-30 Aug 65.
30 Aug 65, 250p. Rept. no. TM(L)-2600/000/01
Contract OCD PS64 58 Proj. 4431C
Unclassified report

Descriptors: (*Civil defense personnel, Training), Civil defense systems, Personnel management, Selection, Job analysis, Supervisory personnel, Learning, Costs

A comprehensive examination of civil defense training is made. After definition of civil defense objectives, a training program analysis is made which established specific training requirements and describes various training program elements. From a perspective including these inputs, the current civil defense training program is analyzed. Three alternative training programs geared to different funding levels and a 'Preparation for Crisis' program are proposed and examined. Evaluation plans for these alternative programs are presented with discussion of cost effectiveness. A theory of instruction for use in civil defense training is pre-

sented. Finally, suggestions for further research are made. (Author)

**AD-622 835 Div. 23/1 ,26/2 ,13/4**
**CFSTI Prices: HC $4.00 MF $1.00**
*STANFORD UNIV CALIF DEPT OF CIVIL ENGINEERING*
**METHODS IMPROVEMENT TECHNIQUES FOR CONSTRUCTION AND PUBLIC WORKS MANAGERS.**
Technical rept.,
by Henry W. Parker. Aug 65, 129p. Rept. no. TR-51
Contract NBy45818
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC.

Descriptors: (*Industrial psychology, Management engineering), (*Management planning, Construction), (*Personnel management, Construction), (*Civil engineering, Management engineering), Job analysis, Manpower studies, Time studies, Photographic techniques, Industrial research, Costs, Reduction, Operations research

This report is essentially an introduction to basic methods improvement techniques that have proved to be particularly applicable to construction and maintenance situations. Three principal subjects are covered. (1) The use of the time-lapse camera to record the job for later study and discussion; (2) The use of crew balance charts and flow diagrams and process charts to analyze and evaluate current methods and to develop new methods; and (3) The use of activity sampling techniques to quickly evaluate the productive output of labor crews. The report will serve as a 'how to' manual for an organization or an individual desiring to improve its effective use of men, machines, time or money. (Author)

**AD-622 903 Div. 23/1 ,23/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*ADJUTANT GENERAL DEPT OF THE ARMY WASHINGTON D C*
**DEVELOPMENT AND CROSS-VALIDATION OF SCORING KEYS FOR LEADERS' COURSE SELECTION INSTRUMENTS.**
20 Dec 49, 17p. Rept. no. PRS-814
Unclassified report

Descriptors: (*Officer personnel, Selection), Leadership, Army training, Tests, Students, Factor analysis, Correlation techniques, Statistical analysis

Two of the instruments developed for selection of men for Leaders' Course were (1) a revision of the Biographical Information Blank for Officer Candidates (OCB), and (2) the Enlisted Man's Evaluation Report (LPE). This study is concerned with the further improvement of both of these instruments as predictors of success of failure in Leaders' Course. Conclusions: (1) Although the LPE demonstrated higher validity than the OCB, the validity of the instruments was higher when they were used in combination. (2) A simplification in scoring the OCB had no appreciable effect on the instrument's validity. (3) The alternative basis of selecting items for the OCB revision did not prove to be profitable. (Author)

**AD-623 008 Div. 23/1 ,30/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL PERSONNEL RESEARCH ACTIVITY SAN DIEGO CALIF*
**APPLICATIONS OF A COMPUTERIZED MODEL IN ENLISTED PERSONNEL PLANNING.**
Research rept.,
by Richard D. Conner, and R. V. May,Jr.. Sep 65, 29p. Rept. no. SRR-66-3
Proj. PF016010901
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Naval personnel, Management planning), (*Personnel management, Mathematical models), Simulation, Decision making, Computers, Wages, Manpower studies

The report describes a computerized algebraic model designed to perform some of the critical functions in the area of enlisted personnel planning in the Navy. The major personnel variables dealt with are attrition, advancements, on board count, vacancies, test passer rates, and requirements. The model simulates the enlisted advancement system and makes predictions of the values of these variables for all nine pay grades of all enlisted ratings for five years into the future. The model is also designed for use as a management tool to predict the results of policy and planning decisions before they are made. (Author)

**AD-623 046 Div. 23/5 ,28/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*ARMY PERSONNEL RESEARCH OFFICE WASHINGTON D C*
**PREDICTION OF SUCCESS IN ARMY AVIATION TRAINING.**
Technical research rept.,
by Harry Kaplan. Jun 65, 77p. Rept. no. TRR-1142
Proj. 2J024701A722
Unclassified report

Descriptors: (*Army training, Effectiveness), (*Aviation personnel, Selection), Pilots, Helicopters, Students, Officer personnel, Rotary wings, Aptitude tests, Psychometrics, Personality, Motor reactions

Research programs were conducted involving the experimental testing of 2000 enlisted men, 1200 officers, and 1200 ROTC cadets. At the start of the program, major attention was given to development and evaluation of measures to select enlisted personnel for rotarywing training, including preflight (OCS-type) training to prepare graduates for warrant officer commissioning. A number of interim test batteries, both fixed-wing and rotary-wing, were developed and operationally implemented. In 1963, recommendation was made for the consolidation of the separate selection procedures into a comprehensive program. The report summarizes the important stages in the separate fixed-wing and rotary-wing research and the more recent effort by which results were integrated in the development of a comprehensive selection program.

**AD-623 048 Div. 23/1 ,28/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY PERSONNEL RESEARCH OFFICE WASHINGTON D C*
**ABSTRACTS OF U. S. APRO RESEARCH PUBLICATIONS. FY 1965.**
Technical research note,
by Emma E. Brown. Aug 65, 48p. Rept. no. TRN-160
Proj. 2J620901A721 ,2J024701A722
Unclassified report

Descriptors: (*Army personnel, Personnel management), (*Research program administration, Army research), Selection, Psychometrics, Display systems, Human engineering, Aviation personnel, Voice communication systems, Reviews

**AD-623 084 Div. 23/1 ,28/4**
**CFSTI Prices: HC $3.00 MF $0.50**
*NAVAL PERSONNEL RESEARCH ACTIVITY SAN DIEGO CALIF*
**THE DEVELOPMENT AND EVALUATION OF A FORCEDCHOICE LETTER OF REFERENCE FORM FOR SELECTING OFFICER CANDIDATES.**
Technical bulletin,
by Bob D. Rhea, Bernard Rimland, and William H. Githens. Sep 65, 56p. Rept. no. STB-66-10
Proj. T A3 1604 02 03S2
Unclassified report

Descriptors: (*Officer personnel, Selection), Personality, Leadership, Correlation techniques, Tables

The purpose of this project was to develop a new form of the Inquiry Questionnaire used in obtaining character references for OCS candidates. Five alternate forms of an experimental reference letter were constructed of forced-choice type personality items. These forms were distributed, along with the operationally used reference questionnaire, to some 12,000 persons named as character references by the applicants for six OCS classes. An average of six completed forms were available for analysis for each accepted officer candidate. The criterion used in the analysis was the average fitness report rating received by the officer during his first 18 months of naval service. Scoring keys, developed through analysis of items against this criterion were derived on part of the sample and validated on the remainder of the sample. Essentially, the findings are negative. Despite the construction of a number of different types of scoring keys, designed to test a variety of hypotheses concerning officer fitness, there was no substantial evidence that the experimental instruments would improve upon the current operational inquiry questionnaire. (Author)

**AD-622 337 See Fld. 13/10**

**AD-622 339 See Fld. 5/10**

**AD-622 714 See Fld. 5/10**

**AD-623 025 See Fld. 5/10**

**AD-623 040 See Fld. 5/10**

**AD-623 041 See Fld. 5/10**

**AD-623 083 See Fld. 5/10**

## 5/10. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

**AD-622 310 Div. 28/1**
*BRYN MAWR COLL PA DEPT OF PSYCHOLOGY*
**SHORTER ARTICLES AND NOTES: PROBABILITY LEARNING IN THE MONKEY,**
by W. A. Wilson,Jr., Marlene Oscar, and M. E. Bitterman. 15 Sep 62, 3p. Contract Nonr282901 Grant ,PHS M4472
Unclassified report

Pub. in Quarterly Journal of Experimental Psychology v16 pt2 May 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Learning, Monkeys), Conditioned reflex, Behavior, Probability, Training, Errors

Tested in a choice-situation, two rhesus monkeys showed a correspondence between choice-ratios and reinforcementratios. The basis of this event-matching proved to be different in the monkey from that in lower forms. (Author)

**AD-622 311 Div. 28/1**
*BRYN MAWR COLL PA*
**CLASSICAL APPETITIVE CONDITIONING IN THE PIGEON. COMMENT.**

Technical rept.,
by M. E. Bitterman. 15 Oct 65, 1p. Rept. no. TR-27
Contract Nonr282901 Proj. NR144 132
Unclassified report

Pub. in Psychon. Sci. v1 p94 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Conditioned reflex, Pigeons), Learning, Psychology, Humans

**AD-622 312 Div. 28/1**
*BRYN MAWR COLL PA*
**THE RELATIVE DIFFICULTY OF REVERSAL AND DIMENSIONAL SHIFTING AS A FUNCTION OF OVERLEARNING.**
Technical rept.,
by Alice F. Schade, and M. E. Bitterman. 1965, 2p. Rept. no. TR-33
Contract Nonr282901 Proj. NR144 132
Unclassified report

Pub. in Psychon. Sci. v3 p283-4 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Learning, Transfer of training), (*Transfer of training, Visual perception), Pigeons, Performance tests, Colors, Geometric forms

Pigeons were trained in series of discriminative problems with stimuli differing both in color and shape, one dimension relevant and the other irrelevant in each problem. An ORE for shape appeared late in the experiment, but color-reversal was retarded by over-training. Overtraining on shape retarded shift to color, but overtraining on color had no effect on shift to shape. Where reversal and shifting differed in difficulty, shifting was easier; the opposite relation was not produced by overtraining. (Author)

**AD-622 313 Div. 28/1**
*BRYN MAWR COLL PA*
**RESISTANCE TO EXTINCTION IN THE PIGEON AS A FUNCTION OF SECONDARY REINFORCEMENT AND PATTERN OF PARTIAL REINFORCEMENT.**
Technical rept.,
by R. C. Gonzalez, Virgil Graf, and M. E. Bitterman. 2 Apr 64, 8p. Rept. no. TR-30
Contract Nonr282901 Grant ,NIH MH9577
Proj. NR144 132
Unclassified report

Pub. in The American Journal of Psychology v78 p278-84 Jun 1965 (Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Conditioned reflex, Pigeons), Learning, Training, Psychology

In a discrete-trials partial-reinforcement experiment of factorial design, the pigeon's resistance to extinction was found to be a function of secondary reinforcement (resistance was greater when the color of the magazine-light was that used on reinforced rather than on unreinforced training trials) and of the pattern of partial reinforcement (resistance was greater after long as compared with short runs of unreinforced trials in training). Neither effect was related to the frequency with which the goalresponse was elicited in extinction. (Author)

**AD-622 314 Div. 28/1**
*BRYN MAWR COLL PA DEPT OF PSYCHOLOGY*
**PROBABILITY-LEARNING BY THE TURTLE,**
by Kathleen L. Kirk, and M. E. Bitterman. 15 Oct 65, 2p. Contract Nonr282901 Proj. NR144 132
Unclassified report

Pub. in Science v148 n3676 p1484-5 June 11 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Learning, Reptiles), Behavior, Conditioned reflex, Colors, Stimulation

Tested in a two-choice situation, the painted turtle, Chrysemys picta picta, shows random probability-matching in visual problems and in confounded visual-spatial problems, but only maximizing or nonrandom matching (reward-following) in spatial problems. The results are compared with those of analogous experiments on fish, bird, and mammal. (Author)

**AD-622 315 Div. 28/1**
*BRYN MAWR COLL PA*
**PHYLETIC DIFFERENCES IN LEARNING.**
Technical rept.,
by M. E. Bitterman. 15 Oct 65, 15p. Rept. no. TR-29
Contract Nonr282901 Grant ,NIMH MH02857
Proj. NR144 132
Unclassified report

Pub. in American Psychologist v20 n6 p396-410 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Learning, Animals), Behavior, Brain, Sensory perception, Motor reactions, Motivation, Vision, Cerebral cortex, Conditioned reflex, Probability, Rats, Fishes, Monkeys, Reptiles, Pigeons, Blattidae, Worms

**AD-622 339 Div. 28/4 ,23/1 ,30/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*PERSONNEL RESEARCH LAB (6570TH) AEROSPACE MEDICAL DIV LACKLAND AFB TEX*
**DEVELOPMENT AND PRELIMINARY VALIDATION OF THE ELECTRONIC DATA PROCESSING TEST-63,**
by William B. Lecznar, and John K. Klesch. Jun 65, 22p. Rept. no. PRL-TR-65-12
Proj. 7717 Task 771705
Unclassified report

Descriptors: (*Computer operators, Aptitude tests), (*Aptitude tests, Computer operators), Data processing systems, Programming (Computers), Word association, Air force personnel

As a result of increasing automation of Air Force records, it is necessary to identify airmen who can be trained to handle new electronic data processing equipment. The Electronic Data Processing Test-63 (EDPT63) was developed to meet this need. The test is composed of 4 subtests: Arithmetic Reasoning, Figure Analogies, Number Series, and Verbal Analogies. This report covers the development and initial validation of EDPT-63 for technical courses 685X0 and 687X0. The test's effectiveness was compared to other possible predictors such as the aptitude indexes of the Airman Qualifying Examination, education, and the Armed Forces Qualification Test (AFQT). EDPT-63 was found to have substantial validity for all of the samples available. In many instances, it was the best single predictor and when its 4 subtests were optimally weighted, they yielded a substantially higher multiple correlation than all other predictors combined. The next most effective predictor was the General Aptitude Index of the Air Qualifying Examination. (Author)

**AD-622 414 Div. 28/3 ,6/5**
**CFSTI Prices: HC $4.00 MF $0.75**
*MOUNT HOLYOKE COLL SOUTH HADLEY MASS*
**FURTHER EXPERIMENTS ON THE RANGE OF VISUAL SEARCH.**
Final rept.,
by John Volkmann, and Horace H. Corbin. Jan 65, 104p. Contract AF19 628 2443 Proj. 7682 Task 768204
ESD , TDR-65-169
Unclassified report

See also AD-608 810.

Descriptors: (*Visual acuity, Target acquisition), (*Target acquisition, Visual acuity), Visual perception, Decision making, Target discrimination, Stimulation, Reaction (Psychology), Behavior, Psychophysiology, Experimental data, Tests, Tables

The report describes six experiments on visual search. Two essential terms in the report are critical number and basal time, defined by the following operations. Median latency of search is plotted as a function of the number of elements in the matrix, for each subject and experimental condition. At low numbers of elements the latency is nearly constant; this is the basal time. Then there occurs a transition to longer latencies. The critical number of the number of elements at which the transition occurs. The aim of the first experiment was to discover whether the critical number varies with the density of the stimulus matrix. Over the entire range of densities employed, it does. Nevertheless, the area corresponding to the critical number is apparently constant over a range of low densities. (This is the area of fast search.) Over a range of high densities, this area decreases considerably. Basal time does not vary with density. The second experiment aimed to check the first one, and to provide evidence on the shape of the area of fast search. The analysis was in terms of the location of the critical elements in the matrix. The constancy of area at low densities was confirmed, although the check was very insensitive. Basal time is constant. The shape of the area appears to be as previously described: ovaloid, with the longer axis horizontal. (Author)

**AD-622 456 Div. 28/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**ON THE PROBLEM OF HYPNOPEDIA,**
by N. D. Zavalova, V. P. Zukhar, and Yu A. Petrov. 22 Sep 65, 12p. Rept. no. FTD-TT-65-783 TT , 65-64181
Unclassified report

Unedited rough draft trans. of Voprosy Psikhologii (USSR) v10 n2 p98-102 1964.

Descriptors: (*Perception (Psychology), Sleep), (*Sleep, Perception (Psychology)), Training, Speech, Learning, Memory, Electroencephalography, USSR

Conclusions: The possibility of acquiring knowledge at the time of natural sleep does exist. With respect to persons with higher suggestibility, in the state of being awake, an adjustment can be created for perception of information (the formation of a peculiar 'watchful point' in the sleepers). Hypnopedia may find broad application in various branches of knowledge: when studying languages, and in the adoption of formulas, ciphers, codes, and other types of information.

**AD-622 504 Div. 28/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*DUKE UNIV DURHAM N C*
**AN EXPERIMENTAL TEST OF A THEORY OF RESPONDENT BEHAVIOR.**
Technical rept.,
by Engin Inel Holmstrom. Sep 65, 49p. Rept. no. TR-19
Contract Nonr118111 Proj. NR177 470
Unclassified report

Descriptors: (*Behavior, Social psychology), (*Social psychology, Behavior), (*Personality, Social psychology), Psychometrics, Reaction (Psychology), Attitudes, Motivation, Social communication, Sociology, Sociometrics, Statistical analysis, Tables

An experiment was conducted in which methodologically imperfect conditions conducive to content-irrelevant responding were created. Subjects'

responses to unstructured questionnaires given under 'normal' test conditions were compared with responses obtained from the same subjects given to structured questionnaires under 'biased' conditions. Judges were used to determine the degree or extent of deviation in responses given to the subsequent or experimental questionnaires. The results indicate first that the use of structured questionnaires increases subjects' evaluation apprehension in that subjects were found to endorse socially-desirable statements more than undesirable statements. Second, subjects, in general, yielded to the biasing effects of the social aspects of the research situation and endorsed both socially-desirable and undesirable items, deviating from their original positions. Third, interest in item-content reduced subjects' content-irrelevant responding, even under explicit social pressures. Fourth, the effects of instrument and personality variables were, to a large degree, dependent on other situational factors, such as interest in itemcontent and the relevancy of the social aspects of the research situation. (Author)

**AD-622 587 Div. 28/1**
**CFSTI Prices: HC $4.00 MF $0.75**
*STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES*
**THE GENERALIZATION FUNCTION IN THE PROBABILITY LEARNING EXPERIMENT.**
Technical rept.,
by Michael V. Levine. 3 Jun 65, 117p. Rept. no. TR-73
Contract AF49 638 1037 ,AF49 638 1253
AFOSR , 65-1595

Unclassified report

Descriptors: (*Learning, Experimental data), Probability, Mathematical models, Conditioned reflex, Functional analysis, Reaction (Psychology)

In this report, the author formulates and studies some methods for obtaining generalization functions from learning data. First he considers mathematical questions and concludes that the generalization function defined with respect to a slight modification of a familiar learning model is essentially determined by the behavior of the individual subject in one experiment. Next it is shown that generalization functions obtained by application of the methods can be used to predict certain empirical functions with great accuracy. Finally, he studies the empirical generalization functions and attempts to describe and account for the relationship between the function and distribution of reinforcements.

**AD-622 628 Div. 28/1 ,28/5**
*PENNSYLVANIA HOSPITAL PHILADELPHIA UNIT FOR EXPERIMENTAL PSYCHIATRY*
**SOCIAL CONTROL IN THE PSYCHOLOGICAL EXPERIMENT: ANTISOCIAL BEHAVIOR AND HYPNOSIS,**
by Martin T. Orne, and Frederick J. Evans. 9 Jun 64, 13p. Contract AF AFOSR88 63
AFOSR , 65-1363

Unclassified report

Pub. in Journal of Personality and Social Psychology v1 n3 p189-200 Mar 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Pennsylvania Univ., Philadelphia.

Descriptors: (*Social psychology, Behavior), (*Psychology, Scientific research), Personality, Conditioned reflex, Reaction (Psychology), Fear, Motivation, Performance (Human)

Rowland and Young found that hypnotized Ss were willing to carry out such apparently antisocial actions as grasping a dangerous reptile, plunging their hand into concentrated acid, and throwing the acid at an assistant. However, only informal attempts were made to show that the Ss perceived the acts as dangerous, or to demonstrate that the requested behavior exceeded the broad limits of social control implicit in the context of a psychological experiment. The experiment conducted by Young was replicated exactly, and his results confirmed. However, nonhypnotizable. Ss simulating hypnosis to a 'blind' E, and even normal, waking control Ss, compiled with the same requests. Ss invariably reported they were convinced the activities were safe because they were participating in research conducted by competent, responsible scientists. It is concluded that the tasks were perceived by Ss as being within the limits of legitimate requests made in an experimental context. The present study does not answer the question whether antisocial behavior can be elicited under hypnosis. However, it demonstrates the nature of control groups essential for a valid test of the antisocial hypothesis, and illustrates the broad range of behavior legitimized in an experimental context. (Author)

**AD-622 685 Div. 28/4 ,28/3 ,16/12**
**CFSTI Prices: HC $4.00 MF $0.75**
*PURDUE UNIV LAFAYETTE IND*
**THE STUTTERING PROBLEM CONSIDERED FROM AN AUTOMATIC CONTROL POINT OF VIEW.**
Doctoral thesis,
by Blaine R. Butler,Jr.. Jan 65, 126p.

Unclassified report

Descriptors: (*Verbal behavior, Bionics), (*Bionics, Verbal behavior), (*Speech, Bionics), (*Cybernetics, Verbal behavior), Psychophysiology, Anomalies, Simulation, Mathematical models, Computers, Therapy, Biophysics, Applied psychology

This study investigates the stuttering problem from an automatic control point of view. In order to accomplish this, it was first necessary to build a mathematical model of the speech system. This model was based on a Fairbanks model. As a first approximation, extreme simplifications were made which ignored the tactile and proprioceptive feedback loops and assumed linearity of the vocal tract and ear in the normal range of operation. This essentially reduced the model to a non-linear system composed of numerous time delays and variable gains. Various instabilities in the system were then considered and their validity in the stuttering problem tested. This was accomplished by applying clinically tested techniques, which decrease or stop stuttering in people, to the mathematical model. The assumption was that if the techniques which decrease or stop stuttering in people also returned the model to a stable state, or normal speech, then this model instability was possible cause of stuttering. The various theories of stuttering, the Sociogenic, Psychogenic, Physiogenic and Learning theories, were used when possible to guide the analysis. This led to the conclusion that a malfunction of the middle ear, a variable gain device, was possible cause of stuttering. (Author)

**AD-622 714 Div. 28/4 ,23/1 ,18/1**
**CFSTI Prices: HC $3.00 MF $0.50**
*APPLIED PSYCHOLOGICAL SERVICES WAYNE PA*
**MULTIDIMENSIONAL SCALING ANALYSIS AND ITS APPLICATIONS FOR THE CIVIL DEFENSE ORGANIZATION,**
by M. A. Fischl, and Arthur I. Siegel. Sep 65, 54p. Contract OCD PS64 30

Unclassified report

Descriptors: (*Civil defense personnel, Psychometrics), Civil defense systems, Job analysis, Performance (Human), Training, Supervisory personnel, Selection, Personnel management, Applied psychology

The report describes the principles and procedures associated with multidimensional scaling analysis, and relates multidimensional scaling analysis to the concept of a personnel subsystem within the Civil Defense organization. Four areas of application of the technique are presented; the authors conclude that the technique is of broad relevance to system planning and is feasible for application to the Civil Defense personnel sybsystem. (Author)

**AD-622 868 Div. 28/5**
**CFSTI Prices: HC $3.00 MF $0.75**
*ILLINOIS UNIV URBANA GROUP EFFECTIVENESS RESEARCH LAB*
**DEVELOPMENT OF A SET OF DIMENSIONS FOR ANALYZING VERBAL GROUP PRODUCTS.**
Technical rept.,
by J. Richard Hackman, and Lawrence E. Jones. Jul 65, 88p. Rept. no. TR-23
Contract Nonr183436 Proj. NR177 472,ARPA Order 454

Unclassified report

Descriptors: (*Group dynamics, Factor analysis), (*Verbal behavior, Group dynamics), Iterative methods, Analysis of variance, Psychometrics, Leadership, Culture, Training, Performance (Human), Attitudes

The report presents the factor analytic development of a set of descriptive dimensions for use in the systematic comparison of verbal products prepared by interacting groups. The dimensions are reliable and account for a major portion of the variance of group products. They are: (a) action orientation, (b) length, (c) originality, (d) outlook (positive vs. negative), (e) quality of presentation, and (f) issue involvement. Relations of the dimensions with selected group and task characteristics are presented. Other applications of the dimensions to problems in the systematic study of group behavior are suggested and discussed. (Author)

**AD-623 022 Div. 28/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*HUNTER COLL OF THE CITY UNIV OF NEW YORK*
**THE EFFECTS OF PERSUASIVE COMMUNICATIONS ON ATTITUDES.**
Annual rept. no. 2, for 1964,
by Walter Weiss. Oct 65, 16p. Contract Nonr430900 Proj. RR006 08 02

Unclassified report

Descriptors: (*Social communication, Effectiveness), (*Attitudes, Social psychology), Behavior, Motivation, Public opinion, Analysis of variance

Research efforts were focused on the role of source in communication effectiveness. Five studies concerned with this matter are described.

**AD-623 025 Div. 28/1 ,23/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*ILLINOIS UNIV URBANA TRAINING RESEARCH LAB*
**SOCIAL REINFORCEMENT AND PERFORMANCE IN PROGRAMED LEARNING IN ITALY.**
Technical rept.,
by Domenico Parisi. Oct 65, 37p. Rept. no. TR-27
Contract Nonr1834 36 ,USOE2 20 003 Proj. NR177 472

Unclassified report

Master's thesis. Research supported in part by HEW, NDEA Title VII contract USOE4 20 002.

Descriptors: (*Learning, Performance (Human)), (*Social psychology, Learning), Achievement tests, Verbal behavior, Reasoning, Intelligence tests, Personality, Attitudes, Motivation, Feedback, Correlation techniques, Students, Italy, United States

The study attempted to assess the effects of social reinforcement on performance in a programed learning task. The four experimental conditions that determined the treatment groups were: positive, negative, positive and negative, and no social reinforcement (evaluating feedback). Information-



794-372 O-65-2

al feedback in the branching program used in the experiment was identical for all groups. One hundred and eight male high school students were randomly assigned to one of the four treatment groups. Results indicate that negative evaluative feedback produced the larger variance in achievement. Performance level is higher when negative reinforcement is given than when it is not given. Positive evaluative feedback reinforcement did not affect performance. The number of significant correlations between achievement, on the one hand, and verbal and abstract reasoning aptitudes and 16 PF intelligence factor on the other hand, tends to decrease with increasing social reinforcement conditions. Social reinforcement attenuates the usual correlation between intelligence and achievement test performance following programed learning.

**AD-623 040 Div. 28/5 ,23/5**
*HUMAN RESOURCES RESEARCH OFFICE GEORGE WASHINGTON UNIV ALEXANDRIA VA*
**AMERICAN ADVISORS OVERSEAS,**
by Edward C. Stewart. Aug 65, 15p. Contract DA44 188ARO2

Unclassified report

Pub. in Military Review v45 n2 p3-9 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Armed forces (Foreign), Military training), (*Military personnel, Public relations), (*Culture, Military psychology), Social communication, Officer personnel, Behavior, Performance (Human), Social psychology, Military training

The objective of the research is to familiarize mission personnel with the historical, sociological, economic, geographic, political, and military background of the host country. Research in Task AREA includes demonstrating methods of preparing and presenting area and cross-cultural knowledge likely to be relevant to mission success in developing countries. Research is also directed toward the use of simulation techniques for the design of training for military advisors.

**AD-623 041 Div. 28/4 ,23/5**
*WALTER REED ARMY INST OF RESEARCH WASHINGTON D C*
**MEASUREMENT OF ACHIEVEMENT MOTIVATION IN ARMY SECURITY AGENCY FOREIGN LANGUAGE CANDIDATES,**
by William E. Datel, Forrest D. Hall, and Charles P. Rufe. 1965, 9p.

Unclassified report

Pub. in Educational and Psychological Measurement v25 n2 p539-45 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Achievement tests, Army personnel), (*Army training, Language), (*Army personnel, Selection), Motivation, Aptitude tests, Intelligence tests, Performance (Human), Students, Statistical analysis, Correlation techniques

Three achievement scales from Gough's California Psychological Inventory were added to the traditional screening armamentarium prior to 290 Army Security Agency soldier-students' engagement in full time study of a foreign language. In terms of use of the differencebetween-means method of analyzing the data on successful 'completions' versus 'dropouts,' it was found that when the attrition rate for the sample was only 7.2 percent, two of the achievement scales significantly differentiated the two subsamples, whereas traditional measures (amount of formal education, GT, and ALAT) failed to do so. A multiple correlation analysis in which grades were used as the criterion was run on the data and, although yielding a very modest multiple correlation coefficient, did produce results which, when viewed in conjunction with the difference between means analysis, suggest that a construct of achievement motivation emerges as a distinct dimension apart from aptitude or intelligence in the prediction of academic success. The findings provide encouragement for the incorporation of achievement motivation scales into selection batteries for academic performance. (Author)

**AD-623 047 Div. 28/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY PERSONNEL RESEARCH OFFICE WASHINGTON D C*
**SOME TECHNICAL CONSIDERATIONS IN MULTIDIMENSIONAL SCALING.**
Technical research note,
by Robert F. Boldt. Aug 65, 19p. Rept. no. TRN-159
Proj. 2T013001A708

Unclassified report

Descriptors: (*Psychometrics, Statistical analysis), Iterative methods, Factor analysis, Scale, Matrix algebra

In an examination of problems arising in multidimensional scaling, the multivariate analysis of interpoint distances into coordinates in m-dimensional Euclidean space is first described. Problems encountered in application of the method are then presented, and solutions developed or suggested by the writer are discussed. The first difficulty was the occurrence of a complex additive constant during the course of Messick-Abelson interations for solutions of relatively low dimensionality. A regression approach is suggested as a reasonable alternative. This approach cannot yield a complex additive constant and was successfully used where the more common method failed. A second problem arose because the common Hotelling method of extracting characteristic roots and vectors does not find the vectors in the algebraic order of the roots. This difficulty, combined with the relative slowness of the Hotelling method, recommends the use of Jacobi's method. A third problem was the occurrence of negative 'distances' obtained when the final additive constant is added to the scale values. It was conjectured that this result may arise in samples even when a proper dimensionality has been defined and the solution sought. A model sampling study of a onedimensional system supported the conjecture. Hence, the occurrence of such negative 'distances' is not necessarily indicative of an underlying structure of higher dimensionality. Finally, it was pointed out that the occurrence of negative 'distances' is actually built into the successive intervals and comparisons approaches. Alternative assumptions were discussed. (Author)

**AD-623 060 Div. 28/3 ,16/12**
*CALIFORNIA UNIV LOS ANGELES BRAIN RESEARCH INST*
**HIPPOCAMPAL MECHANISMS IN PROCESSES OF MEMORY: THOUGHTS ON A MODEL OF CEREBRAL ORGANIZATION IN LEARNING,**
by W. Ross Adey. 1964, 46p. Contract AF AFOSR81 61 Proj. 7164 Task 716402 AFOSR , 65-1502

Unclassified report

Proceedings of Conference (2nd) Los Angeles, Calif. 1962 Univ. Calif. Press Brazier M A B v2 p233-76 UCLA Forum Med Sci N2. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Brain, Learning), (*Memory, Brain), (*Learning, Brain), Performance tests, Hallucinogens, Drugs, Computers, Analysis, Reaction (Psychology), Training, Electrical impedance, Electroencephalography

A discussion is presented of the ablation and drug studies of the system organization of the hippocampus in animals. These studies support the idea that the hippocampal system is vitally concerned in the continued capability to make a discriminative performance involving the integrity of both recent and long-term memory functions. Computer analyses of various aspects of wave processes during discriminative learning indicated strong support of the hypothesis of conveyance of information on the basis of graded analog wave processes. Physicochemical changes in learning were directly monitored by application of impedance measuring techniques to the learning process. (Author)

**AD-623 083 Div. 28/4 ,23/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL PERSONNEL RESEARCH ACTIVITY SAN DIEGO CALIF*
**INFORMATION USE AND TASK SOLUTION EFFICIENCY IN TWO TYPES OF CONCEPT ATTAINMENT TASKS.**
Technical bulletin,
by John D. Ford,Jr., and Harriet M. Braunstein.
Sep 65, 34p. Rept. no. STB-66-9
Proj. PF017030210

Unclassified report

Descriptors: (*Behavior, Personality), (*Personality, Reasoning), (*Reasoning, Psychometrics), Performance (Human), Naval personnel, Tables, Analysis of variance, Correlation techniques

An experiment was conducted which replicated an earlier study done by Westcott (1961) in which he obtained behaviors which he described as intuitive problem solving. The experimenters were interested in reassessing his tentative finding of certain personality items as correlates of that behavior, in determining the relationships of two newly formulated cognitive measures to that behavior, and in testing the generality of these behavioral measures by relating them to similar measures obtained from a concept attainment task. Briefly, the problem solving task allowed Ss to obtain various amounts of information in order to reach a solution. Eighteen male and 18 female Ss completed an 18-item problem solving task, a three-problem concept attainment task, tests of abilities to evaluate problem solutions and to generate problem solutions, and several personality inventories (including those items reported by Westcott). Responses to the problem solving and concept attainment tasks were scored for correctness of solutions and amount of information used to reach solutions. The results support the performance findings of Westcott but fail to support his conclusions of certain personality patterns as correlates of task performance. In contrast, it was suggested that correctness of solution on problem solving may be a function of the ability of Ss to evaluate possible solutions. (Author)

**AD-622 366** See Fld. 9/2

**AD-622 368** See Fld. 9/2

**AD-622 537** See Fld. 6/16

**AD-622 601** See Fld. 6/16

**AD-622 669** See Fld. 6/15

**AD-622 776** See Fld. 12/1

**AD-622 806** See Fld. 5/9

**AD-622 807** See Fld. 5/9

**AD-622 844** See Fld. 6/16

**AD-622 846** See Fld. 6/15

**AD-623 011** See Fld. 6/16

AD-623 023 See Fld. 12/1

AD-623 028 See Fld. 17/2

AD-623 046 See Fld. 5/9

AD-623 048 See Fld. 5/9

AD-623 057 See Fld. 6/1

AD-623 062 See Fld. 6/16

AD-623 084 See Fld. 5/9

## 5/11. SOCIOLOGY

AD-622 570 See Fld. 5/7

AD-623 002 See Fld. 5/7

AD-623 023 See Fld. 12/1

## 6/1. BIOCHEMISTRY

**AD-622 341 Div. 16/3 ,4/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**A FLUOROMETRIC PROCEDURE FOR MEASURING THE ACTIVITY OF DEHYDROGENASES.**
Rept. for Jul 64-Jan 65,
by George G. Guilbault, and David N. Kramer.
Aug 65, 16p. Rept. no. CRDLR-3303
Task 1C622401A10204

Unclassified report

Descriptors: (*Oxidoreductases, Chemical analysis), Fluorescence, Dyes, Chemical indicators, Nucleodides, N-heterocyclic compounds, O-heterocyclic compounds

A simple, direct, fluorometric method is described for measuring the activity of dehydrogenases. The method is based upon the conversion of the nonfluorescent material resazurin to the highly fluorescent compound resorufin, in conjunction with the nicotinamide adenine dinucleotide-reduced nicotinamide adenine dinucleotide (NAD (+)-NADH) system. By the procedures described, approximately 0.00010 to 0.1000 unit/ml of lactic acid dehydrogenase, alcohol dehydrogenase, malic acid dehydrogenase, glutamic acid dehydrogenase, glucose6-phosphate dehydrogenase, L-alphs-glycero phosphate dehydrogenase (GPDH), and glycerol dehydrogenase (GDH) may be determined with standard deviations of approximately =1.0%. Similarly, diaphorase, 0.000400 to 0.0800 unit/ml, resazurin, 0.00000001 to 0.00001 M, and NADH, 0.0000002 to 0.00002 M, may be determined with standard deviations of =0.5%, =0.8%, and =0.5%, respectively. (Author)

**AD-622 529 Div. 16/3**
*EDSEL B FORD INST FOR MEDICAL RESEARCH DETROIT MICH*
**STUDIES ON THE RESPIRATORY CHAIN-LINKED REDUCED NICOTINAMIDE ADENINE DINUCLEOTIDE DEHYDROGENASE IX. REACTIONS WITH COENZYME Q,**
by Joseph M. Machinist, and Thomas P. Singer.
21 Jan 65, 10p. Contract Nonr 165600 Grant, HE01995

Unclassified report

Pub. in Journal of Biological Chemistry v240 n7 p318290 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oxidoreductases, Catalysis), (*Coenzymes, Reduction (Chemistry)), Respiration, Metabolism, Antimetabolites, Phospholipids

Solúble preparations of the reduced nicotinamide adenine dinucleotide dehydrogenase of the respiratory chain catalyze the Amytal- and rotenone-insensitive reduction of short chain coenzyme Q (CoQ) homologues. The turnover number of CoQ1 reduction is low but it is the same as in more complex respiratory chain preparations and is increased several times by thermal denaturation or exposure to acid-ethanol at 42-44C. Amytal- and rotenone-sensitive reduction of externally added CoQ homologues appears to occur only in particulate preparations which contain phospholipids and endogenous CoQ10. The inhibitor-sensitive NADH-CoQ1 reaction is rapidly abolished by treatment of such preparations with low concentrations of purified phospholipase A without attendant liberation of NADH dehydrogenase in soluble form. If the contact between the particle and phospholipase A is of very short duration, NADH-CoQ1 activity may be fully restored on removal of phospholipase A, followed by the addition of suitable phospholipids. The relative efficiency of different phospholipids in restoring the Amytal- and rotenone-sensitive reaction was studied. If digestion with phospholipase A is continued, neither extensive washing of the particles nor the addition of lipids appears to restore NADH-CoQ1 activity. (Author)

**AD-622 549 Div. 16/3**
*CALIFORNIA UNIV BERKELEY DEPT OF MOLECULAR BIOLOGY*
**DISTINCT SUBUNITS FOR THE REGULATION AND CATALYTIC ACTIVITY OF ASPARTATE TRANSCARBAMYLASE,**
by John C Gerhart, and Howard K. Schachman.
7 Apr 65, 9p. Contract PHS CA07410 ,NSF G10795

Unclassified report

Pub. in Biochemistry v4 n6 p1054-62 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Transferases, Molecular properties), Catalysis, Inhibition, Control, Pyrmidines, Phosphates, Nucleotides, Metalorganic compounds, Mercury compounds, Benzoates, Dissociation, Chromatographic analysis, Escherichia coli

The communication presents direct physiochemical studies concerning the enzyme aspartate transcarbamylase (ATCase) in terms of its subunit structure and binding of the specific inhibitory metabolite, cytidine triphosphate (CTP). As judged from sedimentation and viscosity studies, ATCase from Escherichia coli is a compact, globular protein with a sedimentation coefficient (S20,w) of 11.7 S, an intrinsic viscosity of 0.045 dl/g, and a molecular weight of 310,000. Ultracentrifugal analysis of the binding of the CTP analog, 5-bromocytidine triphosphate (BrCTP), reveals the existence of eight receptor sites on the enzyme. Upon the addition of the mercurial, p-mercuribenzoate, native ATCase dissociates into two types of subunits which are easily separable by zone centrifugation of column chromatography. The smaller protein, termed the regulatory subunit, bears the receptor sites for the inhibitor, BrCTP, and is required for the control of enzymic activity. Since the regulatory subunits comprise 37% of the total weight of the native enzyme, it can be calculated that there are four such subunits in each ATCase molecule. Similarly it can be concluded that in the native enzyme contains two catalytic subunits.

**AD-622 723 Div. 16/3**
*EDSEL B FORD INST FOR MEDICAL RESEARCH DETROIT MICH*
**STUDIES ON THE RESPIRATORY CHAIN-LINKED REDUCED NITOTINAMIDE ADENINE DINUCLEOTIDE DEHYDROGENASE. VIII. INACTIVATION, FRAGMENTATION, AND PROTECTION BY SUBSTRATES,**
by Cristiano Rossi, Terenzio Cremona, Joseph M.Machinist, and Thomas P. Singer. 17 Nov 64, 11p. Contract Nonr165600 Grant ,NSF G20457

Unclassified report

Pub. in The Journal of Biological Chemistry v240 n6 p2634-43 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oxidoreductases, Metabolism), Thermal properties, Catalysis, Inhibition, Decomposition, Stabilization, Oxygen, Stereochemistry, Nucleotides, Phosphates, Oxidation, Reaction kinetics, Adsorption spectrum, Paramagnetic resonance, Respiration

The respiratory chain-linked reduced nicotinamide adenine dinucleotide dehydrogenase under anaerobic conditions is protected against thermal inactivation and transformation into NADH-cytochrome reductase by NADH and, to a lesser extent, by NAD, NADPH, and NADP, but not by several related nucleotides. While loss of activity is prevented by substrates, thermal fragmentation of the enzyme into low molecular weight products is not. In the absence of O2, incubation with NADH and NADPH, but not with NAD or NADP, at room temperature causes fragmentation of the enzyme without attendant inactivation or formation of cytochrome reductase activity. In the presence of O2, the substrate-induced fragmentation is accompanied by extensive loss of dehydrogenase activity and emergence of cytochrome reductase activity. The fact that NADPH is a true substrate of the enzyme, although a very poor one, is in accord with the ability of NADPH to produce the same intensity of changes in the absorption and electron paramagnetic resonance spectra of the dehydrogenase as does NADH, although it produces them at much slower rates. (Author)

**AD-622 724 Div. 16/3**
*EDSEL B FORD INST FOR MEDICAL RESEARCH DETROIT MICH*
**STUDIES ON THE RESPIRATORY CHAIN-LINKED REDUCED NICOTINAMIDE ADENINE DINUCLEOTIDE DEHYDROGENASE. X. REACTIONS WITH SULFHYDRYL REAGENTS,**
by Terenzio Cremona, and Edna B. Kearney. 23 Mar 65, 9p. Contract Nonr165600 Grant ,NIH HE01995

Unclassified report

Pub. in The Journal of Biological Chemistry v240 n9 p3645-52 Sep 1965 (Copies not available to DDC or Clearinghouse customers). See also AD-622 529.

Descriptors: (*Oxidoreductases, Metabolism), (*Thiols, Catalysis), Inhibition, Metalorganic compounds, Mercury compounds, Chlorine compounds, Benzoates, Sulfonates, N-heterocyclic compounds, Phosphates, Thermal properties, Nucleotides, Iron compounds, Decomposition

It is shown that organic mercurials and N-ethylmaleimide (EM) rapidly combine with the dehydrogenase in the cold without inactivating it. When the temperature is raised, however, the dehydrogenase activity of the mercurial or EM derivative progressively disappears. This inactivation is irreversible and appears to involve a conformational change in the protein. Inactivation is due to loss of the reactivity of the dehydrogenase with ferricyanide, while the reactivity with NADH remains unaffected. By virtue of its ability to occupy an anion-binding site on the enzyme, phosphate specifically prevents the combination of the enzyme with p-chloromercuribenzoate and p-chloromercuriphenylsulfonate but does not affect the reaction with EM. The -SH groups involved in this reaction appear to be distinct from those which play a role

in electron transport to CoQ and those which emerge on fragmentation of NADH dehydrogenase to NADH-cytochrome c reductase.

**AD-622 882 Div. 16/3**
*WASHINGTON UNIV SEATTLE DEPT OF BIOCHEMISTRY*
**ISOLATION AND STRUCTURE OF AN ACTIVE-CENTER PEPTIDE OF BOVINE CARBOXYPEPTIDASE B CONTAINING THE ZINC-BINDING SULFHYDRYL GROUP,**
by Erhard Wintersberger. 8 May 65, 5p. Contract Nonr47704 Grant ,PHS GM04617
Unclassified report

Pub. in Biochemistry v4 n8 p1533-6 Aug 1965 (Copies not available to DDC or Clearinghouse ustomers).

Descriptors: (*Peptide hydrolases, Molecular structure), (*Peptides, Molecular structure), Thiols, Zinc, Separation, Amino acids, Chemical analysis

A peptide containing the thiol group involved in the binding of zinc in bovine carboxypeptidase B was isolated and its amino acid sequence was determined. The reactive sulfhydryl group was labeled with N- (4-dimethylamino- 3,5dinitrophenyl) maleimide, and the yellow peptide was isolated from a chymotryptic digest of the labeled protein. Compsition, end-group analysis, and degradation by Nagarse and by acid suggest the following amino acid sequency for this active-center peptide: Val. Leu. Pro. Glu. Ser. Gln. Ile. Gln. Pro. Thr. CySH. Glu. Glu. Thr. (Author)

**AD-622 883 Div. 16/3**
*WASHINGTON UNIV SEATTLE DEPT OF BIOCHEMISTRY*
**A ZINC-BINDING THIOL GROUP IN THE ACTIVE CENTER OF BOVINE CARBOXYPEPTIDASE B,**
by Erhard Wintersberger, Hans Neurath, Thomas L.Coombs, and Bert L. Vallee. 8 May 65, 8p. Contract Nonr47704 Grant ,N1H GM04617
Unclassified report

Pub. in Biochemistry v4 n8 p1526-32 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Peptide hydrolases, Thiols), (*Peptides, Molecular structure), (*Thiols, Peptide hydrolases), Zinc, Complex compounds, Amino acids, pH, Organic nitrogen compounds, Carboxylic ester hydrolases

Bovine pancreatic carboxypeptidase B contains a single thiol group which binds zinc to the apoenzyme. This thiol group does not react with sulfhydryl reagents unless zinc is first removed. This can be accomplished either by exposure to chelating agents such as 1,10-phenanthroline or by denaturation. When zinc is removed by exposure to 1,10-phenanthroline, readdition of the metal to the apoenzyme restores both peptidase and esterase activities to the degree expected from the fraction of free thiol present in the apoenzyme. Partial blocking of the thiol group, by reaction with iodoacetamide, prevents reconstitution of the holoenzyme to the degree predicted from the partial modification prior to the addition of metal. Specific substrates, such as benzoylglycyl-L-arginine, or specific inhibitors, such as epsilon-aminocaproic acid, prevent alkylation of the thiol of the apoenzyme and, hence, restoration of esterase activity upon the addition of zinc. Reaction of monocarboxymethyl carboxypeptidase B with sulfite leads to the formation of three additional thiol groups reactive with mercuribenzoate, indicating that in native carboxypeptidase B six of the seven half-cystines are paired in three cystine residues, and one occurs as a metal-mercaptide. (Author)

**AD-623 004 Div. 16/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**ELECTROCHEMISTRY OF ENZYMES. DETERMINATION OF PEROXIDASE AND CATALASE.**
Rept. for Jan 63-Jan 64,
by George C. Guilbault. Sep 65, 19p. Rept. no. CRDLR-3315
Task 1C622401A10204
Unclassified report

Descriptors: (*Enzymes, Chemical analysis), (*Catalase, Electrochemistry), (*Peroxidase, Electrochemistry), Polarographic analysis, Peroxides

Two representative enzyme systems, peroxide-catalase and peroxide-peroxidase, were used in the development of an electrochemical method for their determination. An electrochemically active substrate was oxidized to two electroinactive products by proper control of the current and experimental conditions. A proton donor with nonelectroactive oxidation and reduction forms was used with peroxidase to evolve its enzymatic function. The donor was not electroactive at the potentials used. With this procedure, 0.0100 to 1.00 unit of peroxidase or catalase was determined with a relative standard deviation of 1.7%. The potentials used in the described method were studied by anodic polarographic techniques to determine their significance. (Author)

**AD-623 005 Div. 16/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**INCREASED PLASMA-CHOLINESTERASE ACTIVITY AND SUCCINYLCHOLINE RESISTANCE: A GENETIC VARIANT.**
Rept. for Aug 64-Jun 65,
by Harvey W. Neitlich, and L. A. Mounter. Oct 65, 27p. Rept. no. CRDLR-3321
Proj. 1C622401A097
Unclassified report

Descriptors: (*Cholinesterase, Reaction kinetics), Enzymes, Cholinesterase inhibitors, Parenteral infusions, Electrophoresis, Blood analysis, Inhibition, Genetics, Muscle relaxants

Plasma-cholinesterase activity was determined in medical-volunteer-program subjects. In 1,029 subjects, activity varied from 92 to 1,278 micromoles ACH hydrolyzed/hr, with a mean of 391 micromoles. Plasmacholinesterase activity in one subject was consistently elevated. Examination of his family revelaed that this activity was inherited in an autosomal, dominant manner. In vitro and in vivo studies suggested that the propositus was heterozygous for an enzyme molecule more than three times as active as the usual cholinesterase. The pharmacological effect of this genetic variation is discussed. (Author)

**AD-623 057 Div. 16/3 ,28/3 ,16/12**
*GOTEBORG UNIV (SWEDEN) INST OF NEUROBIOLOGY*
**RNA-A FUNCTIONAL CHARACTERISTIC OF THE NEURON AND ITS GLIA,**
by Holger Hyden. 1964, 42p. Contract AF61 052 248 Proj. 9777 Task 977701
AFOSR , 65-1500
Unclassified report

Proceedings of Conference (2nd), Los Angeles, Calif. 1962 Univ. Calif. Press Brazier M A B v2 p29-68 1964 UCLA Forum Med Sci N2. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Learning, Biochemistry), (*Brain, Ribonucleic acids), (*Nerve cells, Ribonucleic acids), (*Ribonucleic acids, Learning), (*Stimulation, Ribonucleic acids), Proteins, Metabolism, Nuclei (Biology), Sweden

A discussion is presented of functional aspects of brain RNA and the relationship between the neuron and its glia. Special emphasis is placed on compartmentalization of the brain RNA, quantitative aspects, and base composition characteristics, even of fractions of nerve cells. The distribution of brain RNA, as well as the characteristics of neuronal RNA and glial RNA during stimulation and during a learning experiment are discussed. (Author)

**AD-622 719** **See Fld. 10**

**AD-622 770** **See Fld. 6/16**

**AD-622 805** **See Fld. 6/16**

## 6/3. BIOLOGY

**AD-622 438 Div. 16/4 ,16/1**
**CFSTI Prices: HC $5.00 MF $1.00**
*MISSOURI UNIV COLUMBIA*
**ENERGY METABOLISM OF THE CHIMPANZEE: A COMPARISON OF DIRECT AND INDIRECT CALORIMETRY.**
Final rept. for Sep 63-Apr 65,
by H. E. Dale, M. D. Shanklin, H. D. Johnson, and W. H.Brown. Sep 65, 174p. Contract AF29 600 4126 Proj. 6892 Task 689201
ARL , TR-65-17
Unclassified report

Descriptors: (*Chimpanzees, Metabolism), Heat production (Biology), Body temperature, Oxygen consumption, Body weight, Vaporization, Alcohols, Carbon dioxide, Infrared spectroscopy, Sex, Colorimeters, Statistical analysis, Correlation techniques, Tables

Energy Metabolism of the chimpanzee was studied using simultaneously the techniques of direct and indirect calorimetry. The principal objective was to relate the magnitude and variability of the basal metabolic rate measured with the two techniques. Heat loss was measured with a thermoelectric, or gradient, partitional calorimeter; heat production was calculated from oxygen consumption measured with a Pauling meter and carbon dioxide production measured by infrared absorbtion. A total of 827 determinations were made on 14 chimpanzees, 7 males and 7 females. The animals were housed and measurements were made at an environmental temperature of 75 degrees Fahrenheit. All measurements were made in the morning between 8:00 and 12:00 o'clock noon; the subjects were awake, 15 to 18 hours postprandial, and confined to a relatively small cage. From each 40 minute test period a 10 minute low period was delineated to serve as an estimate of the basal metabolic rate. (Author)

**AD-622 498 Div. 16/4 ,16/1 ,16/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**A LIGHT NOT VISIBLE TO THE EYE,**
by A. Turov. 12 Oct 65, 7p. Rept. no. FTD-TT-65-1144
TT , 65-64202
Unclassified report

Unedited rough draft trans. from Izvestiya (USSR) 13 May p4 1965.

Descriptors: (*Luminescence, Tissues (Biology)), Plants (Botany), Wheat, Fats, Lipids, Cancer, Growth, Cells (Biology), Oxidation, Antioxidants, Central nervous system, USSR

**AD-622 544 Div. 16/4 ,16/2**
*ARMY MEDICAL RESEARCH UNIT KUALA LUMPUR (MALAYA)*

**MINIATURE RADIO-TRACKING STUDIES OF THE HOSTS OF VECTOR MITES IN MALAYSIA.**
Master's thesis,
by James W. Gentry. 1964, 4p.
Unclassified report

Pub. in J. Med. Ent. v2 n2 p153-6 20 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Rats, Disease vectors), (*Disease vectors, Monitors), (*Monitors, Rats), Miniature electronic equipment, Radio transmitters, Direction finding, Radio equipment, Behavior, Motion, Malaya

Successful radio-tracking of hosts of vector mites has been accomplished in Malaysia. The home ranges, centers of activity, times of movement and distances moved have been measured for Rattus rattus argentiventer and R. r. jalorensis. Study areas and methods of obtaining data are described, and the advantages of this method are briefly discussed. A bibliography of all radio-tracking literature known to the author is included. (Author)

**AD-622 589 Div. 16/4 ,5/6**
*ARCTIC AEROMEDICAL LAB FORT WAINWRIGHT ALASKA*
**RADIOMETRIC DETERMINATION OF FEATHER INSULATION AND METABOLISM OF ARCTIC BIRDS.**
Final rept. for Feb-Apr 63,
by James H. Veghte, and Clyde F. Herreid. 1965, 17p. Proj. 7164 Task 716409
AMRL , TR-65-111
Unclassified report

Pub. in Physiological Zoology v38 n3 p267-75 Jul 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Alaska Univ., College. Dept. of Biology.

Descriptors: (*Birds, Arctic regions), (*Feathers, Infrared radiation), Radiometers, Surface temperature, Thermal insulation, Stress (Physiology), Body weight

Infrared thermograms of four species of arctic birds the black-capped chickadee, the gray jay, the white-tailed ptarmigan, and the raven-in environments of -7 C to -40 C, were taken with a radiometer. Absolute feather-surface temperatures were determined by comparing a gray scale on the thermogram with densitometer readings. Thermograms of these birds showed the surface temperature of the feathers to be warmest in the eye-auricular region, the breast, and the upper side. Feather-surface temperature closely approached the ambient temperature as the weight and size of the bird increased. Insulation reached a maximum value at a temperature below the critical temperature. There was an overlap between maximal physical thermogenesis and onset of chemical thermogenetic responses to a cold stress. Stability of core temperature was directly related to body weight. These data were used to formulate predictive equations for determining metabolic rates of these birds at various ambient temperatures. (Author)

**AD-622 617 Div. 16/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY ENVIRONMENTAL HYGIENE AGENCY EDGEWOOD ARSENAL MD*
**STUDIES ON LABORATORY REARING TECHNIQUES FOR MEDICALLY IMPORTANT ARTHROPODS.**
Progress rept. for 1 Jun-1 Oct 65,
by James M. Neely, and Carroll L. Mattingly. 1 Oct 65, 9p. Proj. RP0002N1 64 66 Task RP0002N1 64 66 01
Unclassified report

Descriptors: (*Laboratory animals, Arthropods), (*Arthropods, Containers), Insects, Muscidae, Culicidae, Blattidae, Temperature, Temperature sensitive elements

The objective of the project is the development of a shipping container that will enable entomologists to ship live insects of medical importance from the field to the laboratory over long distances. The shipping container used in this study was developed for the shipment of biologicals and temperature sensitive instruments. The container consists of a urethane insulated drum along with four bottles of heat stabilizing material. Properly applied, the material assures a convenient and reliable source of heat or cooling at a constant temperature. Laboratory tests showed that mosquitoes, house flies, and cockroaches could be held in this shipping container without high mortality at temperatures ranging from 120F to 10F for periods up to 72 hours. Field tests conducted with this shipping container revealed that live house flies and cockroaches could be transported successfully back to the laboratory without any mortality after 24 hours in transit and varying temperature. (Author)

**AD-622 878 Div. 16/4 ,16/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*MARYLAND UNIV COLLEGE PARK DEPT OF ZOOLOGY*
**CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE, VOLUME IV, NO. 10,**
by Alena Elbl. 1965, 22p. Contract DA49 193MD2238
TT , 65-64253
Unclassified report

Descriptors: (*Insects, Bibliographies), (*Disease vectors, Bibliographies), Ticks, Mites, Diptera, Siphonaptera, Lice, Bacteria, Spirochoeta, Protozoa, Rickettsia, Parasites, Pesticides, Insecticides, Diseases, Virus diseases, Epidemiology, Ecology, USSR, Eastern Europe, China

**AD-622 909 Div. 16/4**
*LUND UNIV (SWEDEN)*
**MONOAMINES IN THE SWIMBLADDER OF GADUS CALLARIAS AND SALMO IRIDEUS,**
by G. Fahlen, B. Falck, and E. Rosengren. 18 Sep 64, 8p. Contract AF EOAR5 64
AFOSR , 65-1554
Unclassified report

Pub. in Acta Physiol. Scand. v64 p119-26 1965 (Copies available only to DDC users).

Descriptors: (*Levarterenol, Fishes), (*Fishes, Levarterenol), (*Tissues (Biology), Levarterenol), Autonomic nervous system, Nerve cells, Ganglia, Cells (Biology), Amines, Histological techniques, Morphology (Biology), Sweden

The noradrenaline in the swimbladder of the cod and the rainbow trout is stored in short adrenergic neurons whose perikarva are located in close relation to the swimbladder itself. In the cod, the noradrenergie neurons are innervated by noradrenergic neurons that arise from the coeliac ganglion of the sympathetic chain. A hitherto unknown system of epithelial cells storing 5-hydroxytryptamine was observed in the trout swimbladder. (Author)

**AD-622 960 Div. 16/4 ,16/10**
*ARMED FORCES INST OF PATHOLOGY WASHINGTON D C GEOGRAPHIC PATHOLOGY DIV*
**MEDICINE IN TROPICAL AFRICA,**
by Daniel H. Connor. 1965, 2p.
Unclassified report

Pub. in Maryland State Medical Journal Sep 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Africa, Medicine), (*Diseases, Africa), Tropical regions, Infectious diseases, Parasitic diseases, Virus diseases, Bacteria, Fungi, Neoplasms, Ulcers

**AD-622 983 Div. 16/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER*
**DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.**
Annual rept. for 1 Nov 64-31 Oct 65,
by Philip Kashin. 31 Oct 65, 74p. Rept. no. IITRI-L-6021-4
Contract DA49 193MD2281 Proj. IITRI L6021
Unclassified report

See also AD-607 486.

Descriptors: (*Insect repellents, Effectiveness), (*Culicidae, Insect repellents), Mouth, Pest control, Blood, Mice, Adenosine phosphates, Organic compounds

The objective of the program is the development of insect repellents that can be administered systemically, preferably orally. In order to study chemically induced feeding behavior of mosquitoes, chemicals that induce engorgement of mosquitoes were investigated. Although adenosine-5monophosphate stimulates engorgement to some extent, no nucleotide or other compound tested equaled the engorgement-stimulating properties of adenosine-ttriphosphate. Skin permeability to various chemicals was investigated. A new assay procedure was developed in which an electronic device records the probing, penetration, salivation, engorgement, and withdrawal of a mosquito in relation to its host. Each act is distinct and can be separately recognized in the recording of a single mosquito bite. The chart recordings were correlated with the physiological events occuring within the mosquito during engorgement and salivation. Statistical methods were applied to information derived from the electronic recordings, and statistically valid criteria for assessing the repellent-attractant phenomena of chemical compounds were investigated. (Author)

**AD-622 998 Div. 16/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF STATISTICS*
**THE INFLUENCE OF CYTOPLASMIC POLLEN STERILITY ON GENE EXCHANGE BETWEEN POPULATIONS.**
Technical rept.,
by Ernst Caspari, G. S. Watson, and Woollcott Smith. Oct 65, 7p. Rept. no. TR-40
Contract Nonr401009 Proj. NR042 232
Unclassified report

Descriptors: (*Genetics, Cytoplasm), (*Pollen, Fertility), Plants (Botany), Mathematical models

The behavior of cytoplasm and plasmon-sensitive genes producing, in combination, pollen sterility has been reinvestigated taking into account gene flow between populations. It has been repeatedly suggested that cytoplasmic pollen sterility may give rise to a mating barrier which would tend to inhibit gene exchange between populations and in this way initiate speciation. This investigation confirms the findings of an earlier paper (Watson and Caspari, 1960) that there is no basis for this belief. (Author)

**AD-622 603 See Fld. 20/6**

**AD-622 860 See Fld. 6/16**

**AD-622 912 See Fld. 14/2**

**AD-622 955 See Fld. 6/16**

**AD-622 965 See Fld. 8/10**

**AD-623 011 See Fld. 6/16**

## 6/5. CLINICAL MEDICINE

**AD-622 350 Div. 16/13,16/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**INFLUENCE OF GENERAL CHILLING AND HIBERNATION ON THE RESTORATION OF VITAL FUNCTIONS IN ANIMALS AFTER CLINICAL DEATH DUE TO ACUTE LOSS OF BLOOD,**
by V. I. Soboleva. 28 Sep 65, 14p. Rept. no. FTD-TT-65-674
TT , 65-64141
Unclassified report

Unedited rough draft trans. of Patologicheskaya Fiziologiya i Eksperimentalnaya Terapiya (USSR) v6 n1 p28-33 1962.

Descriptors: (*Life span, Hypothermia), (*Hypothermia, Surgical techniques), (*Surgical techniques, Hypothermia), Hibernation, Body temperature, Hemorrhage, Blood transfusions, Hypoxia, Brain, Anesthesia, Narcotics, Cardiovascular system, Central nervous system, Pathology, Physiology, Viability, Dogs, USSR

Conclusions: If the terminal state in the animal develops against a background of hibernation or combined hibernation and hypothermia, subsequent restoration of the vital functions by means of arterial infusion is difficult, and even becomes impossible in a number of cases. Lowered or nullified effectiveness of arterial blood infusion on development of the terminal state under the conditions of hibernation can be accounted for by inactivation of the nervous mechanisms regulating the cardiovascular system under the influence of the neuroplegic preparations. The detrimental effect of the hibernation mixture might also be linked to an aggravating effect of the lytic preparations on the profound inhibition of the central and vegetative nervous systems that prevails in extreme stages of mortification, with the result that the resuscitation process becomes more difficult. (Author)

**AD-622 475 Div. 16/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**CONTENT OF SUGAR AND LACTIC ACID IN SALIVA OF CHILDREN WITH HEALTHY TEETH AND AT MULTIPLE CARIES,**
by S. I. Vays, and A. M. Tarnopolskaya. 22 Sep 65, 7p. Rept. no. FTD-TT-65-784
TT , 65-64198
Unclassified report

Unedited rough draft trans. of Stomatologiya (USSR) v29 n1 p25-7 1951.

Descriptors: (*Teeth, Diseases), Saliva, Lactic acid, Acids, Children, Mouth, Carbohydrates, Dentistry, USSR

Conclusions: In children with multiple caries the sugar and lactic acid level in mixed saliva, taken on empty stomach, is almost three times higher, than among children with healthy teeth. Sugar and lactic acid content in the saliva of children has, apparently, a definite value in the pathogenesis of tooth caries. (Author)

**AD-622 922 Div. 16/5 ,26/1**
*MICHIGAN UNIV ANN ARBOR SCHOOL OF DENTISTRY*
**SIMPLIFICATION OF CHROME-COBALT PARTIAL DENTURE CASTING PROCEDURE,**
by E. R. Dootz, R. G. Craig, and F. A. Peyton. 14 Aug 64, 1p. Contract DA49 007MD938
Unclassified report

Pub. in Journal of Dental Research v44 n5 p1054 Sep-Oct 1965. (Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Teeth, Prosthetics), (*Prostretics, Casting), Chromium alloys, Cobalt alloys, Castings

A technique has been developed using a modified sodium silicate shell-casting process which allows for the casting of a partial-denture framework within 1 hour, from the time of investing to casting, when using high melting chrome-cobalt alloys, and 2 hours when using low melting alloys. This time includes the investing (dipping and dusting of shell) of approximately 2 1/2 minutes for an average casting and a burnout period of 30 minutes for high heat techniques and 1 1/2 hours for low heat techniques. The surfaces of the casting appear to be as smooth as those obtained by present techniques. A preliminary study of the accuracy of five castings in each of the groups indicates that they are -0.31 = 0.14 per cent for high melting alloys and +0.39 = 0.16 per cent for low melting alloys. (Other methods produce castings that vary in size from -0.8 to +0.7 per cent.)

**AD-622 533** **See Fld. 6/12**

**AD-622 696** **See Fld. 6/12**

**AD-622 805** **See Fld. 6/16**

**AD-622 857** **See Fld. 6/16**

**AD-623 011** **See Fld. 6/16**

**AD-623 011** **See Fld. 6/16**

## 6/9. HYGIENE AND SANITATION

**AD-623 011** **See Fld. 6/16**

## 6/12. MEDICAL AND HOSPITAL EQUIPMENT AND SUPPLIES

**AD-622 420 Div. 16/8 ,30/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*REPCO INC ORLANDO FLA*
**PERSONAL TELEMETRY TRANSMITTER SYSTEM.**
Final rept. for Jan 64-Mar 65,
by James A. Almond. Jun 65, 31p. Contract AF33 615 1194 Proj. 7222
AMRL , TR-65-87
Unclassified report

Descriptors: (*Space medicine, Telemeter systems), (*Telemeter systems, Space medicine), Miniature electronic equipment, Medical equipment, Electroencephalography, Electrocardiography, Galvanic skin response, Respiration, Body temperature, Pulse modulation, Circuits, Instrumentation, Feasibility studies, Performance (Engineering), Physiology, Biophysics

The research and development described in this report resulted in the redesign and miniaturization of a Personal Telemetry Transmitter System originally developed by AMRL. The Personal Telemetry Transmitter System transmits seven channels of physiological data on the commercial FM band to a receiver located up to 200 feet away. The seven channels transmitted by pulse duration modulation are electroencephalogram, two leads of electrocardiogram, galvanic skin resistance (base resistance and specific response), respiration, and body temperature. Extremely compact packaging combined with miniature components resulted in a package size of 4.28 by 2.19 by .81 inches for a total volume of 7.6 cubic inches including the battery. (Author)

**AD-622 467 Div. 16/8 ,8/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**ELECTRONICS IN MEDICINE (NOTES ABOUT SOVIET TECHNOLOGY).**
8 Oct 65, 6p. Rept. no. FTD-TT-65-1234
TT , 65-64192
Unclassified report

Unedited rough draft trans. of Ekonomicheskaya Gazeta (USSR) n2 p41 1965.

Descriptors: (*Electronic equipment, Medical research), (*Medical research, Electronic equipment), (*Blood analysis, Electronic equipment), Medical equipment, Blood counts, Erythrocytes, Surgical techniques, USSR

**AD-622 533 Div. 16/8 ,16/5 ,16/13**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY MEDICAL BIOMECHANICAL RESEARCH LAB WALTER REED ARMY MEDICAL CENTER WASHINGTON D C*
**BIOMECHANICAL RESEARCH: PROSTHETIC DEVICES AND MEDICAL SUPPLIES AND EQUIPMENT.**
Quarterly progress rept. for Jul-Sep 65.
Sep 65, 17p.
Unclassified report

Descriptors: (*Prosthetics, Medical equipment), Medical supplies, Artificial limbs, Tissues (Biology), Polymers, Transplantation, Arteries, Extremities, Joints (Physiology), Hands, Earphones, Deafness, Dentistry, Plastic surgery

**AD-622 696 Div. 16/8 ,16/13**
**CFSTI Prices: HC $2.00 MF $0.50**
*HARRY DIAMOND LABS WASHINGTON D C*
**PLASTIC TRICUSPID HEART VALVES,**
by Roy F. High. 2 Aug 65, 39p. Rept. no. TR-1298
Proj. DA1N523801A300 ,HDL96300
Unclassified report

Descriptors: (*Mechanical organs, Heart), (*Heart, Pumps), (*Blood circulation, Pumps), (*Valves, Mechanical organs), Fluid flow, Control devices, Plastics, Tests, Reliability, Manufacturing methods

Research was conducted to fabricate and evaluate valves for a proposed fluid-amplifier heart pump to be used for an extracorporeal support function during surgical operations. A tricuspid valve, modeled after the valve of the human heart, was selected for fabrication. An all-plastic tricuspid valve was fabricated in quantity by methods that gave reproducible leaflet dimensions and reproducible housing dimensions. Based on tests of 11 samples of the final valves, with an average observed life of at least 1100 hr, the true reliability to survive 11 hr of operation or to survive 50 hr of operation was at least 99 or at least 96 percent, respectively, under the conditions of test. The ultimate objective is that the reliability of heart valves, even of those intended for a few hours of operation, should more closely approach 100 percent. The chances of attaining such reliability are better for a ball valve than for a plastic tricuspid valve. Hence, work on plastic tricuspid valves was discontinued. (Author)

**AD-622 895 Div. 16/8**
*CALIFORNIA UNIV LOS ANGELES SPACE BIOLOGY LAB*
**ELECTRODE SYSTEM FOR RECORDING EEG FROM PHYSICALLY ACTIVE SUBJECTS,**
by R. T. Kado, W. R. Adey, and J. R. Zweizig. Nov 64, 1p. Contract AF AFOSR246 63
AFOSR , 65-0941
Unclassified report

Symposium on the Sensing of Bioelectric Potentials, Session 1. Pub. in Proceedings of the 1964 Conference on Engineering in Medicine and Biology (17th) p5 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electroencephalography, Space medicine), (*Electrodes, Electroencephalography), Astronauts, Recording systems

A tin electrode in a stannous chloride solution is used, and the metal part and the electrolyte are contained in a semipermeable ceramic shell. The electrolyte is prepared in dry form containing $SnCl2 . 2H2O$, kaolin, silica gel and 'Natroso' which are combined in a mortar and packed into the cylinder in dry form. The prepared cup is then activated for use by immersion in distilled water for 2 to 3 hours before use. Contact between the skin and the electrode is established by a cylindrical cellulose acetate sponge which is hollowed at one end to accept the ceramic cup assembly. Cable artifacts are eliminated by using MICRO-DOT MINNINOISE coaxial cable. This cable has been specially treated to effectively dissipate separation potentials. Although somewhat larger than a single wire, the noise free characteristics easily justify its use in this type of application. The electrodes are mounted in the inner strapping of a regulation Air Force flight helmet so that they are properly positioned simply by placing the helmet on the head. The system described for collection of EEG from active subjects works well on active subjects engaged in normal functions.

**AD-623 011 See Fld. 6/16**

## 6/13. MICROBIOLOGY

**AD-623 058 Div. 16/2**
*LOBUND LAB UNIV OF NOTRE DAME IND*
**AN ELECTRON MICROSCOPE AND CYTOCHEMICAL STUDY OF ADENOVIRUS IN COLCHICINE-INDUCED, MICRONUCLEATED, TISSUE-CULTURED CELLS,**
by Theodore J. Starr, Masahiro Kajima, and Albert W. Holmes. 1 Mar 65, 15p. Contract Nonr162314

Unclassified report

Pub. in Texas Reports on Biology and Medicine v23 n3 p607-20 1965. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Tissue culture cells, Adenovirus), (*Adenovirus, Tissue culture cells), Electron microscopy, Cytochemistry

Cytochemical staining procedures were used to visualize the chromosomal changes associated with the formation of colchicine-induced, micronucleated, tissue-cultured cells. The sequence of events involved condensation of the metaphase chromosomes and subsequent formation of membranes. Micronucleated cells were challenged with cytoplasmic and intranuclear viruses. As demonstrated by acridine orange staining and electron microscopy, a morphologically intact nucleus was not a prerequisite for virus maturation. In view of the structural and associated functional aberrations of the micronucleated cell, this cell-type is presented as a novel environment for study of host-parasite interactions.

**AD-622 544 See Fld. 6/3**

**AD-622 548 See Fld. 6/15**

**AD-622 550 See Fld. 6/15**

**AD-622 878 See Fld. 6/3**

**AD-622 891 See Fld. 6/15**

**AD-622 955 See Fld. 6/16**

## 6/15. PHARMACOLOGY

**AD-622 542 Div. 16/11**
*CALIFORNIA UNIV LOS ANGELES DEPT OF BIOPHYSICS AND NUCLEAR MEDICINE*
**THE EFFECT OF SYMPATHOMIMETIC AMINES ON FEMORAL ARTERIAL BLOOD FLOW IN THE CAT,**
by A. Kolin, and G. Ross. 3 Nov 64, 9p. Contract PHS H3092

Unclassified report

Pub. in British Journal of Pharmacology and Chemotherapy v25 n1 p126-33 Aug 65 (Copies available only to DDC users).

Descriptors: (*Sympathomimetic agents, Blood circulation), Blood pressure, Arteries, Aorta, Vasoactive agents, Amines, Epinephrine, Levarterenol, Amphetamines, Cats

Changes in the blood flow through the unopened femoral arteries of anaesthetized cats after the local intra-arterial and intravenous injection of adrenaline, noradrenaline, phenylephrine, metaraminol, methylamphetamine, mephentermine, methoxamine and isoprenaline have been determined by an electromagnetic method. The simultaneous recording of mean aortic pressure enabled changes in femoral vascular resistance to be calculated. Local intraarterial injection of isoprenaline reduced, while noradrenaline, phenylephrine, metaraminol, methoxamine and methylamphetamine increased, femoral vascular resistance. Adrenaline and mephentermine produced variable resistance changes. Those agents which increased femoral vascular resistance when given intra-arterially frequently reduced resistance when given intravenously. This reduction accompanied the rise in systemic arterial pressure, but in many animals adrenaline, noradrenaline, phenylephrine and metaraminol frequently induced a further reduction in resistance as the pressor effect declined. These observations are discussed in relation to the current theories of the mechanism of vasodilatation produced by sympathomimetic amines. (Author)

**AD-622 548 Div. 16/11,16/2**
*PENNSYLVANIA UNIV PHILADELPHIA DEPT OF MICROBIOLOGY*
**FUNDAMENTAL PROBLEMS IN DRUG RESISTANCE.**
Research review,
by M. G. Sevag. 1965, 3p.

Unclassified report

Pub. in Medical News 26 Feb and 5 Mar 65 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Drugs, Effectiveness), (*Bacteria, Toxic tolerances), Antibodies, Sensitivity, Adaptation (Physiology), Enzymes, Desoxyribonucleic acids, Reviews

**AD-622 550 Div. 16/11,16/2**
*PENNSYLVANIA UNIV PHILADELPHIA DEPT OF MICROBIOLOGY*
**PREVENTION OF ANTIBIOTIC AND SULFONAMIDE RESISTANCE BY ATABRINE,**
by M. G. Sevag, and Barbara Ashton. 1965, 5p.

Unclassified report

Pub. in Antimicrobial Agents and Chemotherapy p410-4 1964 (Copies not available to DDC or Clearinghouse customers). Research supported by contract with Office of Naval Research, U. S. Dept. of the Navy.

Descriptors: (*Antimalarials, Cinchona alkaloids), (*Bacteria, Sensitivity), Antibiotics, Staphylococcus, Culture media, Desoxyribonucleic acids, Drugs, Inhibition

The emergence of resistant strains is prevented by the antimalarial Atabrine acting in combination with various antibiotics and sulfathiazole. Staphylococci subcultured in sulfathiazole alone are rendered fatally sensitive to Atabrine alone. This phenomenon is observed in systems containing only from 5 to 10 cells per milliliter of medium, excluding, therefore, the selection of any particular cell to account for this phenomenon. The prevention of the emergence of a streptomycin-resistant strain of staphylococcus may occasionally be nullified with 3% phosphate salt in the medium. In either glucose-broth medium or caseinhydrolysate medium containing only 1% phosphate, Atabrine does not fail to prevent the emergence of streptomycin-resistant strains. The theory of these observations is discussed. It is proposed that Atabrine combines with deoxyribonucleic acid and prevents the resistant-inducing action of an antibiotic. Clinical application of the drug plus Atabrine combination has produced dramatic results. (Author)

**AD-622 669 Div. 16/11,28/3**
*ARMY MEDICAL RESEARCH LAB FORT KNOX KY EXPERIMENTAL PSYCHOLOGY DIV*
**THE INFLUENCE OF D-AMPHETAMINE, BENACTYZINE, AND CHLORPROMAZINE ON PERFORMANCE IN AN AUDITORY VIGILANCE TASK,**
by Michel Loeb, Glenn R. Hawkes, W. O. Evans, and Earl A. Alluisi. 2 Aug 65, 8p. Rept. no. 637 Proj. DA 3A014501B74C Task DA 3A014501B74C01,18
AFOSR,

Unclassified report

Pub. in Psychon. Sci. v3 p29-30 1965 (Copies not available from CFSTI to DDC or Clearinghouse customers). Copies available from USAMRL, Fort Knox., Ky.

Descriptors: (*Auditory perception, Pharmacology), (*Drugs, Auditory perception), Attention, Psychophysiology, Auditory signals, Performance (Human), Amphetamines, Chlorpromazine, Tranquilizers, Parasympatholytic agents, Sympathomimetic agents, CNS depressants, CNS stimulants

Detections, false responses, and latencies were measured for Ss monitoring auditory signals (moreintense noise pulses in a pulse train) over a 1-hr period following administration of either a stimulating drug, an anti-adrinergic tranquilizer, an anticholinergic tranquilizer, or a placebo. It was concluded that changes in performance over time under the placebo were explicable in terms of shifts toward conservatism in S's criteria for responding; under the tranquilizers, similar shifts in criteria occurred as well as decline in effective sensitivity. Under the stimulating drug (d-amphetamine), performance remained essentially constant over the duration of the 1-hr vigil. (Author)

**AD-622 837 Div. 16/11**
*CALIFORNIA UNIV LOS ANGELES BRAIN RESEARCH INST*
**A NEUROPHYSIOLOGICAL COMPARISON OF GAMMAHYDROXYBUTYRATE WITH PENTOBARBITAL IN CATS,**
by W. D. Winters, and C. E. Spooner. 3 Aug 64, 10p. Contract AF AFOSR246 63, PHS5TIMH6415
AFOSR, 65-0938

Unclassified report

Pub. in Electroencephalography and Clinical Neurophysiology, Netherlands v18 p287-96 1965 (Copies available only to DDC users).

Descriptors: (*Anesthetics, Effectiveness), (*Electroencephalography, Anesthetics), Nervous system, Physiology, Brain, Sleep, CNS depressants, Fatty acids, Alcohols, Cast

The paper compares the neurophysiological actions of gamma-hydroxybutyrate (GHB) with pentobarbital in cats with chronically implanted electrodes. Observations were performed on gross behavior, EEG activity and averaged response to clicks. The major behavioral and EEG effects following GHB are as follows: 60 mg/kg no perceptible differences; 100-200 mg/kg - animal crouched, pupils dilated, head elevated, hypersalivates and occasionally vomits during spindling EEG pattern; 200600 mg/kg - intermittent hypersynchronous bursts, posture unchanged, the electrical activity shifts to continuous hypersynchronous 2.5 c/sec waves; 400-600 mg/kg spiking initially more pronounced in limbic leads while the hypersynchrony slows to 1.5 c/sec in other leads, followed by generalized high amplitude spikes and short polyphasic bursts with short periods of electrical silence between spikes in all leads. There are periods of spontaneous myoclonic jerks which are intensified by stimuli. On the basis of gross behavior, EEG patterns and averaged evoked response to clicks it appears that GHB and pentobarbital do not have similar properties. The action of GHB is similar to generalized non-convulsant epilepsy. It is proposed that the clinical efficacy of this agent may be based on the induction of a lack of responsiveness rather than by virtue of specific anesthetic properties. A re-evaluation of the desirable properties of anesthetic agents and the anesthetic state seems in order as a result of the apparent clinical success which GHB has had as an anesthetic agent. (Author)

**AD-622 846 Div. 16/11,16/12**
*CALIFORNIA UNIV LOS ANGELES BRAIN RESEARCH INST*
**PROLONGED EFFECTS OF LSD ON EED RECORDS DURING DISCRIMINATIVE PERFORMANCE IN CAT: EVALUATION BY COMPUTER ANALYSIS,**
by W. R. Adey, R. Porter, D. O. Walter, and T. S. Brown. 27 May 64, 11p. Contract AF AFOSR246 63 ,NsG203 62
AFOSR , 65-0940

Unclassified report

Pub. in Electrocephalography and Clinical Neurophysiology v18 p25-35 1965 (Copies available only to DDC users). Prepared in cooperation with Veterans Administration Hospitals, Long Beach and Los Angeles, Calif.

Descriptors: (*Lysergic acids, Behavior), (*Electroencephalography, Lysergic acids), Tolerances (Physiology), Brain, Tissues (Biology), Psychotropic agents, Cerebral cortex, Training, Data processing systems, Cats

The effects of LSD were studied in relation to changes induced in computed averages of epochs of EEG records during a discriminative task performance in a series of six cats repeatedly exposed to LSD over a period of many months. Computed averages were prepared from daily training tests of 20 and 40 trials. LSD (75 micrograms/kg) was given in single doses by intraperitoneal injection at intervals of not less than 3 weeks. The findings indicate persistent electrophysiological effects of LSD beyond the period of acute drug action. However, these changes ran a shorter course than the tolerance to LSD exhibited by man and animals. They showed a differential distribution in different brain regions, with maximal changes in the hippocampus, and smaller effects in the entorhinal cortex and the rostral midbrain reticular formation. Evidence is presented of highly focal differences in late responses within the hippocampus. Differential susceptibility of hippocampal tissue is discussed in relation to a similar sensitivity to the acute effects of both LSD and psychotomimetic cyclohexamines, and to the pattern of propagation of hippocampal after-discharges. (Author)

**AD-622 891 Div. 16/11,16/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**SERRATIA MARCESCENS ENDOTOXIN SHOCK.**
Technical rept. for Aug-Oct 64,
by Henry P. Ciuchta, James A. Vick, and James H. Manthei. Sep 65, 18p. Rept. no. CRDLR-3310
Task 1C522301A079

Unclassified report

Descriptors: (*Serratia marcescens, Toxins + antitoxins), Toxic tolerances, Respiration, Central nervous system, Cardiovascular system, Toxicity, Shock (Pathology), Hypotension, Blood pressure, Nerves, Neuromuscular transmission, Artificial respiration, Drugs, Physiology, Escherichia coli, Dogs

The effect of crude Serratia marcescens endotoxin on the physiological behavior of the dog was studied. Dogs administered crude S. marcescens endotoxin experienced an initial hypotension, partial recovery, and a secondary terminal fall in blood pressure similar to that previously described for Escherichia coli endotoxin shock. Animals in this study, however, died primarily of respiratory failure rather than cardiovascular collapse. Evisceration eliminated only the initial fall in blood pressure. Artificial ventilation at time of respiratory arrest extended time to death, but all animals subsequently expired with signs of respiratory collapse. The phrenic nerve, the neuromuscular junction, and the diaphragm appeared to be relatively unaffected by the endotoxin, indicating that respiratory failure probably occurs in the central nervous system. Temporary respiration was restored by Metrazol; however, all animals expired. Crude S. marcescens endotoxin may have two independent actions--one on the central respiratory mechanism and another on the cardiovascular system. The various fractions are being correlated with pharmacological activity in current studies. (Author)

**AD-622 682** **See Fld. 6/16**

**AD-622 770** **See Fld. 6/16**

## 6/16. PHYSIOLOGY

**AD-622 342 Div. 16/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**ULTRASTRUCTURE OF THE PANCREATIC ISLET CELLS OF THE GOAT (CAPRA HIRCUS).**
Technical rept.,
by Nobuko O. Kuhn, and Jacob Lundy. Sep 65, 20p. Rept. no. CRDLR-3306
Proj. 1M012501A027

Unclassified report

Descriptors: (*Pancreas, Bovines), Electron microscopy, Visual inspection, Histology, Biological stains, Cells (Biology), Membranes (Biology), Granules

The islet of Langerhans of the goat (Capra hircus) was examined by light and electron microscopy. The islets were discrete and widely dispersed. Sections stained with aldehyde fuchsin showed abundant betagranules in the islet cells; however, alpha-cells were never selectively stained. Typical beta-and alpha-cells were seen by electron microscopy, and the beta-granule had a fibrillar pattern with a dense core. The alphagranule appeared round and electron-dense. Delta-cells in large numbers and intergrade cells with both alphaand beta-cell characteristics were noted. An islet closely associated with centroacinar and acinar cells was seen, and both types of cells contained secretory granules. (Author)

**AD-622 457 Div. 16/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**REVIEW OF COMPENDIUM 'INFLUENCE OF IONIZING RADIATION ON THE FUNCTIONING OF THE HIGHER SECTIONS OF THE CENTRAL NERVOUS SYSTEM OF OFFSPRING',**
by N. L. Livshits. 28 Sep 65, 9p. Rept. no. FTD-TT-65-860
TT , 65-64182

Unclassified report

Unedited rough draft trans. of Patologicheskaya Fiziologiya i Eksperimentalnaya Terapiya (USSR) v7 n3 p90-91 1963. Review of book by I. A. Piontkovskii, pub. Moscow, 1961, 210p.

Descriptors: (*Embryos, Radiation effects), (*Radiation effects, Central nervous system), Rats, Pregnancy, Radiological dosage, Morphology (Biology), Radiobiology, Pathology, Conditioned reflex, Reviews

**AD-622 469 Div. 16/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**REACTION CHARACTERISTICS OF THE HEMOGENIC SYSTEM IN THE PERIOD OF RESTORING ITS FUNCTIONS AFTER RADIATION AFFLECTION,**
by I. M. Shuryan, V. V. Andryushchenko, and G. M. Rekun. 20 Sep 65, 13p. Rept. no. FTD-TT-65-655
TT , 65-64194

Unclassified report

Unedited rough draft trans. of mono. Vosstanovitelnye Protssessy pri Radiatsionnykh Porazhenyakh: Sbornik Statei n.p., 1964 p164-71.

Descriptors: (*Hemopoietic system, Radiation effects), (*Radiation effects, Hemopoietic system), Radiation sickness, Radiological dosage, Hematology, Blood counts, Bone marrow, Blood cells, Morphology (Biology), Mitochondria, Erythrocytes, Leukocytes, X rays, Beta particles, Electron microscopy, Radiobiology, Pathology, Rabbits, USSR

**AD-622 537 Div. 16/1,16/12**
*RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE*
**PROBABILITIES ASSOCIATED WITH SPIKE DISCHARGES IN AUDITORY NERVE FIBERS,**
by P. R. Gray, N. Y. S. Kiang, and J. W. Shipley. 1965, 1p. Contract DA36 039AMC03200E
Grant ,NSF GP2495

Unclassified report

Pub. in The Physiologist v8 n3 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Auditory nerve, Nerve impulses), (*Nerve impulses, Probability), Nerve fibers, Nerve cells, Ear, Stimulation, Refraction, Statistical analysis

The time patterns of spike discharges in auditory nerve fibers are influenced by both stimulus characteristics and refractory properties of the neurons. Conventional post stimulus-time (PST) histograms reflect the combined influence of these two factors, but these factors can be studied separately by appropriate processing of the data. Statistical analyses of spontaneous activity suggest that one may consider a neuron to be 'recovered' when it has not discharged during the previous 20 msec. The effect of the stimulus on a fiber that has apparently recovered can be studied by estimating the conditional probability of a spike in a particular interval of time, given some minimum time since the last firing. Analysis of these 'recovered probabilities' helps to explain certain otherwise puzzling features of the conventional PST histograms and

leads to a more complete understanding of the relation between discharge probabilities of these fibers and the mechanical motion of cochlear structures. (Document quoted in its entirety.)

**AD-622 601 Div. 16/1 ,16/12**
*CALIFORNIA UNIV LOS ANGELES BRAIN RESEARCH INST*
**NORMAL SLEEP PATTERNS IN MACAQUE MONKEY,**
by M. L. Reite, J. M. Rhodes, E. Kavan, and W. R. Adey. 29 Sep 64, 12p. Contract AF AFOSR246 63 ,NSG505 AFOSR , 65-0939

Unclassified report

Pub. in Archives of Neurology v12 p133-44 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sleep, Monkeys), (*Electroencephalography, Sleep), Brain, Cerebral cortex, Nervous system, Physiology, Eye, Motion

Normal sleep patterns of the Macaca nemestrina monkeys were studied in six subjects for 20 nights. Bipolar EEG records were secured from surface and deep electrodes. Eye movements were monitored by EOG and by closedcircuit TV. Clicks were continuously presented at foursecond intervals. EEG records were divided into the following stages: awake, drowsy, light, intermediate, deep, and paradoxical. Sleep phases were cyclic, with cycle durations of 75 to 85 minutes, thus resembling human sleep, but the longest segments of deep sleep occurred in the early part of the night. Paradoxical phases occurred during the latter half of the night. Awakening during the night was usually correlated with an initial shift to fast activity in the pontine reticular formation, followed by changes in other deep structures, and lastly, if at all, in cortical areas. (Author)

**AD-622 608 Div. 16/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL SCHOOL OF AVIATION MEDICINE PENSACOLA FLA*
**SAFE HUMAN TOLERANCE FOR HIGH CONCENTRATIONS OF CO OVER SHORT PERIODS OF TIME.**
Research rept.,
by Arthur L. Hall, Charles A. Patterson, and James K. Colehour. 26 Feb 51, 16p. Proj. NM001 059.24 01
NAVMED , NM001 059.24.01

Unclassified report

Descriptors: (*Aviation medicine, High altitude), (*Respiration, High altitude), (*Carbon compounds, Monoxides), Tolerances (Physiology), Aviation personnel, Time, Exposure, Hemoglobin, Hematocrit, Blood volume, Metabolism, Tables

The purpose of the study was to determine concentrations of carbon monoxide in air required to give a carboxyhemoglobin increase of 7% in subjects at rest at an altitude of 10,000 feet. Exposure times of 5, 3, and 1 minute (s) and 40, 20, and 10 seconds were used. The concentrations of carbon monoxide required were 0.55, 0.975, 2.63, 3.28, 5.70, and 18.35%, respectively. When adjusted to standard conditions, these figures fit the curve derived from Pace's formula (1): Percent increase in COHb = Parts CO x MinVol x Exposure Time/ 42.5 x Blood Volume. (Author)

**AD-622 682 Div. 16/1 ,16/11**
**CFSTI Prices: HC $4.00 MF $0.75**
*CORNELL UNIV ITHACA N Y COGNITIVE SYSTEMS RESEARCH PROGRAM*
**THE UPTAKE OF GAMMA-AMINOBUTYRIC ACID AND NOREPINEPHRINE BY SUBCELLULAR FRACTIONS OF RAT BRAIN,**
by William F. Herblin. 1 Sep 65, 124p. Rept. no. 7
Contract Nonr40140 ,Grant NSF GP971

Unclassified report

Descriptors: (*Levarterenol, Brain), (*CNS depressants, Brain), (*Brain, Biochemistry), Central nervous system, Drugs, Metabolism, Biosynthesis, Amino acids, Fatty acids, Enzymes, Nerve impulses, Nerve cells, Metochondria, Morphology (Biology), Nervous system, Physiology, Inhibition, Chemical bonds, Labeled substances, Graphics, Tables, Rats

The uptake of two candidate transmitters by subcellular components of neuronal tissue is examined. Gamma aminobutyric acid and norepinephrine, radioactively labeled, were incubated with isolated fractions of brain homogenates and the decrease in the radio-activity of the soluble phase measured. The uptake was determined as a function of the final concentration of the candidate. The effects of drugs on the uptake phenomena were also determined. The uptake of GABA seems to be due to a rapid binding to an external site on the nerve ending particle, followed by a binding to a series of internal sites. The uptake of norepinephrine is due to at least three distinct phenomena. These can be partially separated by density gradient centrifugation and appear to be associated with microsomes, nerve endings, and either mitochondria or a more dense population of nerve endings. Methods for the study of the uptake of GABA and norepinephrine have been established and the effects of certain procedural modifications have been determined. The basic characteristics of the uptake of these two substances have also been determined, and it has been shown that in both cases the phenomenon is a multi-phasic process which must be studied systematically. In addition, preliminary data has been provided on the activation and inhibition of the uptake by various drugs.

**AD-622 745 Div. 16/10,16/1**
*BLOOD RESEARCH FOUNDATION CENTER TORTONA (ITALY)*
**HISTOCHEMICAL STUDIES OF BROWN PIGMENTATION OBSERVED IN THE LYMPH NODES OF BOVINES AND IN THE JEJUNAL MUCOSA OF HUMANS (STUDIO ISTOCHIMICO DELLA PIGMENTAZIONE BRUNA (PIGMENTATIO FUSCA) OSSERVATA IN LINFONODI DI BOVINI E NELLA MUCOSA DIGIUNALE UMANA),**
by F. Ceretto, G. Astaldi, and R. Penna. 1965, 17p.

Unclassified report

Pub. in Gazzetta Internazionale di Medicine e Chirurgia v70 n1 p910-24 1965 (Copies available only to DDC users).

Descriptors: (*Histological techniques, Organic pigments), (*Organic pigments, Histological techniques), Lymphatic system, Bovines, Intestines, Mucus, Membranes (Biology), Humans, Tissues (Biology), Biological stains, Italy

Histochemical researches on appositio slides and tissue sections demonstrated that brownish pigment previously observed by the Authors in the human jejunal mucosa and in lymph nodes from normal cattle is basophilic, acid-fast (long Ziehl-Neelsen), not metachromatic and not sudanophilic. On the contrary the pigment shows reduction sites, carboxil groups or oxy-acid; it does not demonstrate aldehydes, ketones, and proteins-end groups; it does not contains iron, bile and carotenoid-pigment, and hemofuscin. Besides, the pigment is not soluble in acids, alkali and various solvents, and may be not bleached by chlorate, H2O2 and 40% peracetic acid; it does not polarize the light and it is not fluorescent. The Authors suggest that pigment is a particular type of lipofuscin in a mittle stage of oxidation, PAS negative and acid-fast which may be classified at an intermediate level between lipofuscin sensu strictu and melanin, likewise of the pseudomelanosis pigment and considered of exogenous origin. (Author)

**AD-622 747 Div. 16/10,6/1**
*BLOOD RESEARCH FOUNDATION CENTER TORTONA (ITALY)*
**STRUCTURAL SIMILARITIES BETWEEN A PIGMENT FOUND IN THE INTESTINAL LYMPH NODES OF CATTLE AND A PIGMENT FOUND IN THE HUMAN JEJUNAL MUCOSA (ANALOGIE STRUTTURALI TRA UN PIGMENTO IN LINFONODI INTESTINALI DI BOVINI ED UN PIGMENTO NELLA MUCOSA DIGIUNALE UMANA),**
by G. Astaldi, R. Penna, and F. Ceretto. 1964, 13p.

Unclassified report

Pub. in Minerva Medica v55 n102 p4105-9 Dec 22 1964 (Copies available only to DDC users).

Descriptors: (*Histological techniques, Organic pigments), (*Organic pigments, Histological techniques), Lymphatic system, Bovines, Intestines, Mucus, Membranes (Biology), Humans, Diet, Tissues (Biology), Biological stains, Italy

A granular, brownish-black, Schmorl-positive, PASnegative pigment, giving a negative reaction to stains for iron, not discolourable by 130 vol. H2O2, etc., was found in the medullary layers of mesenteric lymph nodes from young cattle fed with broad beans (Vicia faba). The similarities between the chemical properties of this pigment and those of a pigment previously observed by Astaldi and Strosselli in the human jejunal mucosa are stressed. These similarities suggest that it may possibly be the same pigment. The hypothesis is suggested that in both instances the pigment is a favic pigment, introduced with the diet. (Author)

**AD-622 748 Div. 16/10**
*BLOOD RESEARCH FOUNDATION CENTER TORTONA (ITALY)*
**HISTOPATHOLOGY OF THE DUODENAL-JEJUNAL MUCOSA OBTAINED BY CROSBY BIOPSY IN A CASE OF NUTRITIONAL MEGALOBLASTIC ANEMIA FOLIC ACID-RESPONSIVE (ISTOPATOLOGIA DELLA MUCOSA DUODENODIGIUNALE OTTENUTA CON BIOPSIA ALLA CROSBY IN UN CASO DI ANEMIA MEGALOBLASTICA NUTRIZIONALE FOLICO-RESPONSIVA),**
by R. Penna, F. Ceretto, and G. Astaldi. 1964, 11p.

Unclassified report

Pub. in Acta Vitaminologica n6 p259-68 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Intestines, Pathology), (*Anemias, Deficiency diseases), (*Histological techniques, Intestines), Histology, Mucus, Membranes (Biology), Nutrition, Folic acid, Edema, Connective tissue, Cells (Biology), Italy

In a nutritional megaloblastic anemia case, responsive to folic acid, partial or subtotal atrophy of the villi was observed in the duodenal-jejunal mucosa: the epithelial cells presented, in some tracts, alterations of progressive severity, to the point of being detached, with conseguent loss of the sheathing epithelium, which was sometimes replaced by fibrinoid material on the mucosal surface. Moreover, edema and round cell infiltration of the villous tunica and of the pericryptic area, the presence of pseudocrypts, alterations of the glandular acini, and hyperplasia of the interstitial connective tissue of Brunner's glands, with a tendency to fibrosis, were also observed. (Author)

**AD-622 758 Div. 16/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PHYSIOLOGICAL EFFECTS OF GRAVIATION,**
by O. G. Gazenko, and A. A. Gurjian. 7 Oct 65, 29p. Rept. no. FTD-MT-65-223
TT , 65-64247

Unclassified report

Edited machine trans. of 8-oye Plenarnos Sobranie i 6-oy Mezhdunarodnyi Simpozium Po Kosmicheskim Naukam. Buenos-Aires, 10-21 May 65.

Descriptors: (*Weightlessness, Adaptation (Physiology)), Physiology, Acceleration tolerance, Central nervous system, Behavior, Astronauts, Vestibular apparatus, Space perception, Illusions, Motor reactions, Cardiovascular system, Stress (Physiology), Space flight, Space medicine, USSR

**AD-622 761 Div. 16/10**
*MANITOBA UNIV WINNIPEG DEPT OF MEDICINE*
**GENERAL DESCRIPTION-MORTALITY AND INCIDENCE OF CORONARY HEART DISEASE. PART I. BUILD, BLOOD PRESSURE AND ELECTROCARDIOGRAPHIC FACTORS POSSIBLY ASSOCIATED WITH THE DEVELOPMENT OF CORONARY HEART DISEASE. PART II,**
by F. A. L. Mathewson, D. C. Brereton, W. A. Keltie, F. S. A. Paul, and G. I. Paul. 8 May 65, 13p. Contract MT1170 ,DRB 8810 02
Unclassified report

Pub. in Canadian Medical Association Journal v92 947-53 and 1002-6 May 1 and 8 1965 (Copies available only to DDC users).

Descriptors: (*Cardiovascular diseases, Etiology), Males, Pilots, Physical fitness, Blood pressure, Electrocardiography, Medical examination, Heart, Statistical analysis, Canada

**AD-622 770 Div. 16/1 ,16/3 ,16/11**
*KAROLINSKA INST STOCKHOLM (SWEDEN) DEPT OF PHYSIOLOGY*
**UPTAKE OF CATECHOLAMINES IN THE RABBIT HEART AFTER DEPLETION WITH DECABORANE,**
by U. S. v. Euler, and F. Lishajko. 9 Mar 65, 5p. Contract AF EOAR65 52
AFOSR , 65-1553
Unclassified report

Pub. in Life Sciences v4 p969-72 1965 (Copies available only to DDC users).

Descriptors: (*Decaboranes, Heart), (*Heart, Amines), Injection (Medicine), Levarterenol, Epinephrine, Tables

After 80 - 90 per cent depletion of the rabbit heart with decaborane, injection of noradrenaline (NA) causes an increase of the amine content to near normal values. The amines taken up show normal distribution between the high speed sediment and supernatant, indicating a dynamic equilibrium between the particulate and the supernatant fractions. The amines taken up leave the heart gradually in some 20 hours. When either the 1or the d-isomer of adrenaline (A) is injected together with 1-NA. 2 - 3 times more of 1-A than of d-A is taken up for the same amount of 1-NA. The two isomers appear to leave the stores at a similar rate. (Author)

**AD-622 777 Div. 16/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL SCHOOL OF AVIATION MEDICINE PENSACOLA FLA*
**AIRSICKNESS IN STUDENT AVIATORS,**
by Gary J. Tucker, David J. Hand, Asa L. Godbey, and Roger F. Reinhardt. 12 Jul 65, 12p. Rept. no. NSAM-939
NAVMED , MR005.13-6001.6-1
Unclassified report

Descriptors: (*Aviation medicine, Motion sickness), (*Motion sickness, Aviation personnel), Naval training, Students, Flight, Training, Pilots, Performance (Human), Stress (Physiology)

One thousand sixty-seven student Naval aviators were rated at the end of each flight during the presolo and basic acrobatic phase of training by the flight instructor for the presence or absence of nausea or vomiting during the flight. To be so rated, the airsickness had to be severe enough to cause inability to control the aircraft. In this manner, a profile of the patterns of airsickness was obtained on each student over the course of the primary flight training. The incidence of this type airsickness was 17.6 per cent (188 students out of 1.067). Correlations between incidents of airsickness per student and their ground school grades and flight grades were not statistically significant. There are three main periods during which the majority (79 per cent) of airsickness occurs. These are the initial three training flights, the seventh, and the first three dual acrobatic flights. These periods are closely correlated with the various and different peaks of physiologic and psychologic stresses during this phase of training and provide useful baselines for the evaluation of airsickness in student aviators. (Author)

**AD-622 805 Div. 16/1 ,16/13,16/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF*
**EFFECT OF EXCHANGE TRANSFUSION ON INCORPORATION OF THYMIDINE-H3 INTO DEOXYRIBONUCLEIC ACID AND ON MITOSES IN HEPATOCYTES OF NORMAL AND REGENERATING RAT LIVER,**
by J. W. Grisham, G. F. Leong, M. L. Albright, and J. D. Emerson. 23 Aug 65, 50p. Rept. no. USNRDL-TR-886
Proj. MR005 08 5201
Unclassified report

Descriptors: (*Liver, Blood transfusions), (*Blood transfusions, Mitosis), (*Desoxyribonucleic acids, Blood transfusions), Cells (Biology), Regeneration, Excision, Nucleosides, Autoradiography, Labeled substances, Rats

Exchange transfusion of blood (75 to 80 percent replacement of blood of recipient animals) was used to study the effect of blood-borne influences on labeling of DNA and occurrence of mitoses in hepatocytes of rat liver. Intact or sham-hepatectomized rats and partially hepatectomized rats were (1) not transfused, (2) transfused with blood from rats with intact livers, or (3) transfused with blood from rats with partly excised livers. Partially hepatectomized or sham-hepatectomized or sham-hepatectomized rats were transfused once or twice (consecutively) at intervals after operation. Non-hepatectomized rats were transfused at equivalent times before they were killed. Incorporation of thymidine-H3 was detected autoradiographically and mitoses were counted in histological sections. The following effects on labeling of DNA and occurrence of mitoses in hepatocytes were found: (1) no change in rats with intact livers transfused with blood from donor rats with either intact or partly excised livers, (2) depression or delay in partially hepatectomized rats transfused with blood from donor rats with intact livers (delay prolonged by two consecutive transfusions), and (3) a variable depression or delay in partially hepatectomized rats transfused with blood from partially hepatectomized donor rats (the extent of depression of the peak rate of DNA labeling normally occurring at 24 hours after hepatectomy was directly related to the mass of residual liver in donor rats). (Author)

**AD-622 841 Div. 16/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL SCHOOL OF AVIATION MEDICINE PENSACOLA FLA*
**EFFECTS OF PROLONGED CALORIC STIMULATION UPON OCULOMOTOR, VESTIBULOSPINAL, AND SEGMENTAL SPINAL ACTIVITY.**
Research rept. no. 2,
by Bo E. Gernandt, Makoto Igarashi, and Harlow W. Ades. 24 Jun 65, 21p. Rept. no. NSAM-934
Proj. MR005 13 2005 Task 4
NAVMED , MR005.13-2005 4
Unclassified report

Prepared in cooperation with National Aeronautics and Space Administration.

Descriptors: (*Vestibular apparatus, Stimulation), Ear, Semicircular canals, Peripheral nervous system, Eye, Motion, Spinal column, Nerves, Nerve fibers, Temperature, Monkeys

The effects of prolonged caloric stimulation with hot (45C) or ice water have been studied upon eye movements, vestibulospinal, and segmental spinal activity. The results obtained under this variety of test conditions demonstrate that continuous irrigation with water of extreme temperatures evokes, in addition to the effects upon the position of the cupula by endolymphatic convection currents according to the theory of Barany, an initial excitatory thermal effect giving rise to an increased afferent firing which is followed by a paralyzing effect upon the vestibular sensori-neural structures. In order to localize more specifically the site of action of thermal stimulation, experiments were carried out upon labyrinthectomized squirrel monkeys and monkeys with the three semicircular canals plugged. These results, and those obtained by recording the cochlear microphonic and neural components to click stimulation during maximal cold and warm irrigation of the ear, indicate that the effect is upon the peripheral nerve fibers somewhere along their course from the ampulla to the internal auditory meatus. Earlier theories which have predicted this direct effect on the nerves are mentioned, but, for the present, without comment as to their respective importance in explaining paradoxical caloric reactions. (Author)

**AD-622 844 Div. 16/1 ,16/12**
*CALIFORNIA UNIV LOS ANGELES BRAIN RESEARCH INST*
**CORTICAL-SUBCORTICAL RELATIONSHIPS OF THE CHIMPANZEE DURING DIFFERENT PHASES OF SLEEP (CORRELATIONS CORTICO-SOUSCORTICALES CHEZ LE CHIMPANZE PENDANT LES DIFFERENTES PHASES DE SOMMEIL),**
by J. M. Rhodes, M. R. Reite, Dan Brown, and W. R. Adey. 1965, 25p. Contract AF AFOSR246 63 ,NsG502
Unclassified report

Pub. in Colloques Internationaux du Centre National de la Recherche Scientifique n127 Sep 9-11 1963 (Copies available only to DDC users).

Descriptors: (*Sleep, Chimpanzees), (*Cerebral cortex, Sleep), Electroencephalography, Brain, Stimulation, Nervous system, Physiology, Data Processing system, Symposia

**AD-622 857 Div. 16/10,16/13**
*CALIFORNIA UNIV LOS ANGELES BRAIN RESEARCH INST*
**RECENT FINDINGS IN THE PATHOGENESIS OF DECOMPRESSION SICKNESS (DYSBARISM),**
by A. T. K. Cockett, Robert M. Nakamura, and J. J. Franks. 18 Dec 63, 7p. Contract AF AFOSR61 81
Unclassified report

Pub. in Surgery v58 n2 p384-9 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Decompression sickness, Pathology), (*Blood volume, Decompression sickness), Surgical techniques, Histology, Lungs, Liver, Kidneys, Bone marrow, Gas embolism, Erythrocytes, Blood pressure, Labeled substances, Dogs

A technique for the production of gaseous bubbles in dogs is presented. Plasma volumes decrease 4 to 38 percent of control values 4 1/2 to 5 1/2 hours after removal of 7 dogs from the decompression chamber. Red cell volumes do not change. The role of bubble formation with progressive reduc-

tion in blood pressure is discussed in the slower deaths of 10 animals. Bone marrow emboli were found on routine histologic sections of the lungs. (Author)

**AD-622 859 Div. 16/1 ,16/15**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL SCHOOL OF AVIATION MEDICINE PENSACOLA FLA*
**PERCEPTION OF THE VISUAL HORIZONTAL IN NORMAL AND LABYRINTHINE DEFECTIVE SUBJECTS DURING PROLONGED ROTATION.**
Joint rept.,
by Brant Clark, and Ashton Graybiel. 8 Jul 65, 12p. Rept. no. nsam-936
NAVMED , MR005.13-6001.1-116
Unclassified report

Descriptors: (*Visual perception, Rotation), Vestibular apparatus, Acceleration, Deafness, Illusions, Adaptation (Physiology), Stress (Physiology)

Five normal and nine labyrinthine defective men were studied in a Slow Rotation Room which produced a change in resultant force of 20 degrees on them. The men faced in the direction of rotation and at one minute intervals set a luminous line to the perceived horizontal in darkness for one hour. The results for the normal men confirmed an earlier study showing no systematic change in the perception of the visual horizontal after an initial lag effect. In contrast, the labyrinthine defective men showed a smaller, rapid, and then a gradual change in the perception of the visual horizontal throughout the one hour of constant rotation. At the end of one hour there was no significant difference between the two groups. These results are discussed in terms of a differential weighting of the synergistic information available to the two groups. (Author)

**AD-622 860 Div. 16/1 ,16/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL SCHOOL OF AVIATION MEDICINE PENSACOLA FLA*
**COMPARATIVE COCHLEAR RECONSTRUCTION IN MAMMALS.**
Joint rept.,
by Makoto Igarashi, and Toshiko Yoshinobu. 11 Jun 65, 17p. Rept. no. nsam-931
NAVMED , MR005.13-6001.1-114
Unclassified report

Descriptors: (*Ear, Mammals), Anatomy, Histology, Head, Laboratory animals, Humans, Dogs, Cats, Monkeys, Guinea pigs, Rabbits, Rats, Bats

The size, length, and shape of the cochleas are compared in different mammalian species, with the use of graphic cochlear reconstructions. The ratio between the size of the cochlea and that of the skull generally decreases when the skull size increases. In other words, the size of the cochlea in small mammals is considerably larger. The number of cochlear turns increases when the cochlea protrudes into the well-pneumatized mastoid bulla instead of being embedded in the thick otic capsule. (Author)

**AD-622 917 Div. 16/10,16/1**
*BLOOD RESEARCH FOUNDATION CENTER TORTONA (ITALY)*
**ON THE BROWN-BLACK PIGMENT (PIGMENTATIO FUSCA) IN LYMPHONODES OF YOUNG BEEF CATTLE AT MEAT INSPECTION (SULLA PIGMENTAZIONE BRUNA (PIGMENTATIO FUSCA) IN LINFONODI DI BOVINI NORMALMENTE MACELLATI,**
by Filippo Ceretto, Renzo Penna, and Giovanni-Astaldi. 1964, 4p.
Unclassified report

Reprint. Publication not identified. (Copies available only to DDC users). Supported in part by Army European Research Office and the Blood Research Foundation, Washington, D. C. Text in Italian.

Descriptors: (*Histological techniques, Organic pigments), (*Organic pigments, Bovines), Lymphatic system, Beef, Diet, Biological stains, Tissues (Biology), Italy

Histochemistry of a brown lipofuscin pigment in lymphonodes of normally slaughtered young beef cattles is reported. The authors suggest that these brown pigment is not a 'waste pigment', but it is due to feeding for a long time (6-8 months) with field beans (Vicia faba). (Author)

**AD-622 921 Div. 16/1**
*PENNSYLVANIA UNIV PHILADELPHIA DEPT OF PHYSIOLOGY*
**INDEPENDENCE OF LUTEINIZING HORMONE AND ADRENOCORTICOTROPHIN SECRETION IN THE RAT,**
by V. D. Ramirez, Dianne Moore, and S. M. McCann. 9 Oct 64, 6p. Contract AF AFOSR62 133 ,NIH AM01236 08 Proj. 9777 Task 977701 AFOSR , 65-1509
Unclassified report

Pub. in Proceedings of the Society for Experimental Biology and Medicine v118 p169-75 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Adrenocorticotropic hormone, Secretion), Pituctary hormones, Sex glands, Ovaries, Estrogens, Inhibition, Steroids, Rats

Experiments were performed on adult, virgin female rats to determine if alterations in the titers of circulating adrenal and ovarian steroids would (1) produce alterations in the secretion of both luteinizing hormone (LH) and adrenocorticotrophin (ACTH), or (2) modify only the secretion of the trophin specific for the particular target gland. Results showed that alteration of the target gland steroids produced specific effects on LH in the case of ovarian steroids, and ACTH in the case of cortical steroids. Estrogen can stimulate ACTH secretion and inhibit LH secretion simultaneously. (Author)

**AD-622 925 Div. 16/1 ,16/10**
*PENNSYLVANIA HOSPITAL PHILADELPHIA DEPT OF MOLECULAR BIOLOGY*
**THOUGHTS ON THE MOLECULAR MECHANISM OF THE NORMAL INTESTINAL MUCOSA AS A BARRIER TO SODIUM ION MOVEMENT AND MASSIVE FLUID LOSS IN CHOLERA,**
by Gilbert N. Ling. 1965, 4p. Contract Nonr437100 Grant ,PHS GM11422 01 Proj. NR105 327
Unclassified report

Pub. in Proceedings of the Cholera Research Symposium, 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Cholera, Diarrhea), (*Intestines, Semipermeability), (*Electrolytes (Physiology), Transport properties), Sodium, Ions, Osmosis, Membranes (Biology), Mucus, Cells (Biology), Tissue fluids, Adsorption, Water, Toxins + antitoxins

It is suggested that the major cause of diarrhea in cholera may be only partly due to the suppression of the sodium pump, but is largely due to the failure of the normal function of intestinal mucosal cells as a barrier to massive fluid movement. This resistance of massive fluid movement in normal cells is ascribed to the low permeability of the entire cells (not merely the cell membrane) toward the diffusion of tissue fluid electrolytes and nonelectrolytes, with prime emphasis on the Na (+) ion. The low permeability, in turn, is explained as being due to unfavorable energy (for site adsorption) and to entropy (for passage through cell water); both arise from the existence of cell proteins as a uniform three-dimensional network equipped with free ionic and H-bonding groups. The adsorption of ions and water in protoplasm are considered as key properties which underlie the high resistance toward ion and nonelectrolyte passage. The functional state of the cell can be altered by the interaction of specific toxins with certain cardinal sites on the cell proteins, producing explosive cooperative changes to a different state of aggregation which no longer offers resistance to massive fluid movement. It is suspected that perhaps vibrio toxins may act on these cardinal sites. (Author)

**AD-622 930 Div. 16/1**
*NAVAL HOSPITAL PHILADELPHIA PA DIV OF GASTROENTEROLOGY*
**EFFECT OF PROTEIN ADMINISTRATION ON AMMONIA LEVELS OF PATIENTS WITH LIVER DISEASE,**
by Orville F. Nielsen, Yun-Kuang Liang, and Woo Y. Chey. 1964, 10p. Proj. MR005 12 1105
NAVMED , MR005.12-1105
Unclassified report

Pub. in the American Journal of the Medical Sciences, v250 n2 p39/121-48/130 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Liver, Diseases), (*Ammonia, Blood chemistry), Proteins, Diet, Blood transfusions, Albumins, Parenteral infusions

About half the patients tested with Laennec's cirrhosis of the liver showed an inability to handle a normal diet without elevating the arterial blood ammonia levels. There was no direct correlation of the elevated ammonia levels with any laboratory or clinical features of the disease, except, in general, the more marked the cirrhosis, the greater the likelihood of an abnormal response. Whole blood or human albumin, in the doses used, can be administered intravenously to patients with severe liver disease and abnormal fasting ammonia levels without appreciably altering the blood ammonia. However, albumin given orally to the same patients definitely elevates the arterial blood ammonia level. Four patients with a porta-caval shunt showed elevated fasting blood ammonia levels and significant increases after eating protein meals. In 2 cases, there was no appreciable change in the ammonia response pre- and postshunt. The same test repeated one year later in 2 cases also showed similar results. (Author)

**AD-622 951 Div. 16/9**
*ARMY MEDICAL RESEARCH AND NUTRITION LAB DENVER COLO*
**DIETARY PHOSPHORUS AND MAGNESIUM DEFICIENCY IN THE RAT,**
by G. E. Bunce, H. E. Sauberlich, P. G. Reeves, and T. S. Oba. 18 Mar 65, 10p.
Unclassified report

Pub. in The Journal of Nutrition v86 n4 p406-14 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Deficiency diseases, Diet), (*Phosphorus, Deficiency diseases), (*Magnesium, Deficiency diseases), Nutrition, Calcium, Absorption (Biological), Kidneys, Urinary system, Excretion, Urine, Histological techniques, Rats

Calcium, phosphorus and magnesium balance was studied in weanling rats, using 3 dietary levels of magnesium (130, 260 and 1,000 ppm) at each of 3 levels of phosphorus (0.3, 0.5 and 1.0%). The effect of changes in dietary phosphorus on magnesium balance varied and was dependent on the dietary magnesium concentration; high intakes of phosphorus lowered the apparent absorption of magnesium when magnesium was ample, but improved absorption when magnesium was limiting. Similarly, high intakes of magnesium reduced the apparent absorption of phosphorus only when ample quantities of phosphate were consumed. Variations in magnesium intake caused a pattern of calcium absorption which closely resembled

the pattern obtained for fecal phosphorus, implying a possible effect of magnesium on calcium phosphate solubility in the gut. Accumulation of calcium in the kidneys was aggravated by either an increase in phosphorus or a decrease in magnesium. Microscopic examination of the kidneys after staining with alizarin red S revealed urolithiasis alone when the accumulation of excess calcium was minimal, but both urolithiasis and nephrocalcinosis when considerable calcium was present. This evidence supports the observations of others that intratubular cast deposition is the primary lesion in magnesium deficiency and thus suggests that magnesium might be of value in the prevention or control of spontaneous urolithiasis. (Author)

**AD-622 952 Div. 16/9 ,16/10**
*ARMY MEDICAL RESEARCH AND NUTRITION LAB DENVER COLO*
**EFFECTS OF COPPER, MOLYBDENUM, AND ZINC ON ZINC-65 TISSUE DISTRIBUTION AND EXCRETION IN THE RAT,**
by Kenneth E. Kinnamon, and George E. Bunce.
20 Jan 65, 6p.

Unclassified report

Pub. in Journal of Nutrition v86 n3 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Zinc, Metabolism), Nutrition, Diet, Tissues (Biology), Distribution, Excretion, Copper, Molybdenum, Bone, Urine, Growth, Antimetabolites, Radioactive isotopes, Rats

Tissue distribution and excretion of injected Zn65 have been studied in both male and female rats maintained with increased dietary levels of different combinations of 3 mineral nutrients: copper (100 mg/kg), molybdenum (800 mg/kg), and zinc (5000 mg/kg). Results obtained indicate that diets high in zinc caused a significant increase in bone retention and urinary excretion and a significant decrease in soft tissue retention of intraperitoneally injected Zn65. Increased dietary levels of copper or molybdenum or both, did not elicit a similar effect. Significant growth retardation was observed only in animals maintained with a ration high in both molybdenum and zinc. (Author)

**AD-622 955 Div. 16/10,16/4 ,16/2**
*MEDICAL COLL OF SOUTH CAROLINA CHARLESTON*
**KNOWLESI MALARIA IN MONKEYS II. A FIRST STEP IN THE SEPARATION OF THE MECHANICAL PATHOLOGIC CIRCULATORY FACTORS OF ONE SLUDGE DISEASE FROM POSSIBLE SPECIFIC TOXIC FACTORS OF THAT DISEASE,**
by Melvin H. Knisely, Warren K. Stratman-Thomas, Theodore S. Eliot, and Edward H. Bloch.
1964, 6p. Contract PHS H4176 ,PHS H7114

Unclassified report

Pub. in Angiology v15 n9 p411-16 Sep 1964 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Tennessee Univ., Memphis.

Descriptors: (*Hemosporidia, Diseases), (*Monkeys, Hemosporidia), (*Blood circulation, Parasitic diseases), Pathology, Physiology, Toxins + antitioxins, Reticuloendothelial system, Erythrocytes, Heparin, Parasites, Blood coagulation

The fundamental purpose of this paper is to introduce a rigorous experimental method for separating and determining the significance of individual sets of mechanisms of the pathologic physiology of certain disease states. The contrast is noted between the visible circulatory factors in completely healthy-normal rhesus monkeys and in monkeys which are dying of Stage III Knowlesi malaria, a condition in which the blood is very severely agglutinated.

**AD-622 956 Div. 16/10**
*MEDICAL COLL OF SOUTH CAROLINA CHARLESTON*
**EXPERIMENTAL SEPARATION OF QUITE DIFFERENT TYPES OF CIRCULATORY SHOCK,**
by Melvin H. Knisely. 1964, 21p. Contract Nonr166000 Grant ,PHS H4176 Proj. NR101 065

Unclassified report

Pub. in Shock and Hypotension p295-315 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Shock (Pathology), Blood circulation), (*Blood coagulation, Shock (Pathology)), Pathology, Blood vessels, Hemorrhage, Oxygen consumption, Tissues (Biology), Molecular weight, Dextran, Wounds + injuries, Healing, Kidneys, Brain, Liver, Heart, Central nervous system, Histology, Reviews

The paper presents in detail a review of a major block of experimental evidence which demonstrates that intravascular aggregation, or agglutination of the blood--that is, sludge--directly causes reduced forward rates of blood flow, including the plugging of vessels, and that this forcible reduction in the rates of blood flow through the capillaries of each of a series of tissues (liver, kidney, heart, central nervous system) reduces the rate of delivery of oxygen to the tissues and interferes with the functions of the tissues, even to the extent of causing visible histologic damage. The paper also (1) points out that there are types of circulatory shock in which no sludge is present or need be present; (2) lists specific types of damage done to the body by sludge (other than the forcible reducing of the rates of flow through tissues) and gives major references to which the reader may turn for detailed descriptions of each type of damage; (3) points out some of the specific visible characteristics of the flow of blood and of the conditions of vessel walls which are a necessary part of good health. The physical conditions of the blood and blood flow and of vessel walls found in those types of shock in which sludge is present can only be recognized as pathologic when seen as conspicuous contrasts to the known conditions of blood and flow during health. (Author)

**AD-622 957 Div. 16/9**
*ARMY MEDICAL RESEARCH AND NUTRITION LAB DENVER COLO*
**INFLUENCE OF PERIODICITY OF EATING IN THE CHICKEN,**
by Gilbert A. Leveille, and Richard W. Hanson.
7 Dec 64, 5p.

Unclassified report

Pub. in The American Journal of Physiology v209 n1 p153-7 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Diet, Chickens), (*Chickens, Diet), Food, Body weight, Cholesterol, Digestive system, Lipids, Liver, Fatty acids, Synthesis, Glucose, Metabolism

Male chickens were fed either ad libitum (nibblers) or allowed access to food for only 2 hr daily (meal eaters). The influence of these feeding regimens on body weight, body composition, plasma cholesterol, relative size of the digestive tract, and liver lipids was studied over a 14-week period. Body weight and percent body fat of meal-eating chicks were significantly lower throughout the study period. Plasma cholesterol levels were higher for meal-eating chicks at the 3- and 6-week sampling periods, but not after 10 and 14 weeks on the experimental regimens, suggesting that meal eating induces a transient hypercholesterolemia. Relative size of the digestive tract was increased in the meal-eating chicks. The rate of lipogenesis from acetate was higher in meal-eating chicks both in vivo and in vitro. In vivo fatty acid synthesis from glucose was also enhanced by meal feeding. The data presented suggest that the meal-eating chick and rat are metabolically similar. (Author)

**AD-622 959 Div. 16/1**
*GEORGE WASHINGTON UNIV WASHINGTON D C BLOOD RESEARCH LAB*
**NORMAL METABOLISM,**
by Edward Adelson. 1965, 8p. Contract DA49 193MD2273 ,DA49 193MD2325

Unclassified report

Pub. in Federation Proceedings v24 n4 p810-5 Jul-Aug 65 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Fibrinogen, Metabolism), Radioactive isotopes, Labeled substances, Iodine, Half life, Blood plasma, Fibrin, Plasmin, Thrombin, Anticoagulants, Blood coagulation, Liver

Fibrinogen is formed in the liver; its rate of formation varies from time to time; it probably enters the circulation by the lymphatics; approximately 75% is present in the intravascular compartment and 25% in the extravascular compartment; I131 can be used to tag fibrinogen providing one stays below levels of one atom of iodine per molecule of fibrinogen; fibrinogen survival in humans has a half-life of approximately 2.1 -3.8 days; fibrinogen turnover in grams per day is approximately 1.5-5 g; changes in the half-life of fibrinogen do not occur very commonly from patient to patient; changes in total fibrinogen destruction per day do occur depending upon changes in plasma volume and fibrinogen concentration; and fibrinogen catabolism is a first-order kinetic process. It cannot be said for certain whether conversion of fibrinogen to fibrin occurs in normal states. The question of whether fibrinogen turnover is altered by in vivo states of coagulation is also unresolved. (Author)

**AD-622 976 Div. 16/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS*
**SOME PHYSIOLOGICAL ACCOMPANIMENTS OF SPEAKING.**
Joint project rept.,
by John W. Black. 1 Apr 52, 35p. Rept. no. JPR-10
Contract N6onr22525 Proj. NR142 992
NAVMED , NM001 064.01.10

Unclassified report

Descriptors: (*Speech, Physiology), Acid-base equilibrium, Carbon dioxide, Acoustic properties, Pressure, Respiration, Sound, Speech representation, Intensity

Loud speaking involves hyperventilation. The CO2 content of alveolar gas is reduced during the speaking. The effects of nine minutes of loud reading upon the acid-base balance are not overcome in six minutes of rest. As a first approximation, the relationship between the volume of exhaled gas per unit of time and the sound pressure level (db) of a vowel-sound is apparently linear. Integrated values of the respiratory volume and the acoustic pressure that accompany the production of consonants and vowels show that: (a) the final consonant includes more acoustic pressure (and is longer) than the initial consonant; (b) saying vowels and consonants requires about the same amount of exhalation, while the vowels may contain several times as much acoustic pressure as the consonants; and (c) there are wide individual differences in the amount of gas exhaled by different speakers maintaining the same acoustic level of loud speech. (Author)

**AD-622 992 Div. 16/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**INVESTIGATION OF CHINCHILLA-VESTIBULAR SYSTEM RESPONSE TO VERTICAL LINEAR ACCELERATION.**

Master's thesis,
by Daniel William Buehler, and Lucious Calvin Butt. 1965, 42p. Rept. no. GE/EE/65-6
Proj. 7231 Task 723102

Unclassified report

Descriptors: (*Vestibular apparatus, Acceleration), Eye, Ear, Adaptation (Physiology), Stress (Physiology), Accelerators, Extremely low frequency, Experimental data, Data processing systems, Rodents, Graphics

Electronystagnus measurement of vertical eyeball displacement was used to investigate chinchilla vestibular response to vertical sinusoidal accelerations which varied incrementally from 0.5 to 20 cps in frequency and from 0.5 to 3 g, peak-to-peak, in amplitude. Frequency diagrams, plotted from data obtained from seven animals, indicated that the magnitude of the response of the vestibular apparatus is a function of frequency and g level, but that the phase lag of the response is a function of frequency only. Within the experimental frequency and acceleration limits, no resonance phenomena or hysteresis effect of vestibular response was found. (Author)

**AD-623 011 Div. 16/1 ,16/4 ,16/5 ,16/6 ,+**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C*
**SUBJECT AND AUTHOR INDEX TO REPORTS, JANUARY 1957-DECEMBER 1964.**
Dec 64, 35p.

Unclassified report

Descriptors: (*Military medicine, Subject indexing), (*Medical research, Indexes), (*Naval research, Medical research), Accidents, Anesthesia, Anthropology, Anthropometry, Artificial respiration, Blood chemistry, Breathing apparatus, Bites + stings, Burns, Cardiovascular diseases, Dentistry, Disease vectors, Food, Histological techniques, Injection (Medicine), Insecticides, Levarterenol, Medical equipment, Medical supplies, Military psychology, Military personnel, Pathology, Physiology, Physical fitness, Protective clothing, Respiratory diseases, Sanitary engineering, Shelters, Surgical supplies, Toilet articles, Virus diseases, X rays

**AD-623 029 Div. 16/1 ,16/10**
*NEW YORK STATE UNIV ALBANY RESEARCH FOUNDATION*
**THE EFFECT OF TEMPERATURE AND PH ON THE RATE OF REACTION OF CARBON MONOXIDE AND OXYGEN WITH RED BLOOD CELLS IN NORMAL AND ANEMIC SUBJECTS, AND THE EFFECT OF HYPOXIA ON PULMONARY DIFFUSION OF CO IN NORMAL AND ANEMIC SUBJECTS.**
Annual progress rept.,
by W. H. Lawson,Jr.. Oct 65, 7p. Contract DA49 193MD2701

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Anemias, Respiration), (*Hypoxia, Blood circulation), Temperature, pH, Carbon compounds, Monoxides, Oxygen consumption, Erythrocytes, Lungs, Tissues (Biology), Adaptation (Physiology), Stress (Physiology), Hypothermia, Exercise, Reaction kinetics

The general objective of this work was to investigate physiologic adaptations and limitations of tissue oxygen delivery under stresses such as hypothermia, hypoxia, and/or exercise. Hypoxia was considered from the standpoints of low inspired O2 concentration and anemia. The methods of approach were: (A) Investigation of rates of gas exchange with red blood cells measured in vitro as a function of temperature and pH in normal and anemic subjects. (B) Investigation of the circulatory responses in pulmonary capillaries to alveolar hypoxia from the standpoint of gas diffusion for CO and pulmonary capillary blood flow.

**AD-623 038 Div. 16/10**
*ARMED FORCES INST OF PATHOLOGY WASHINGTON D C*
**HEMOLYTIC GLAUCOMA,**
by Robert H. Fenton, and William S. Hunter. 1964, 18p.

Unclassified report

Rept. also includes Iowa State Univ., Iowa City, Dept. of Ophthalmology: Persistent Hyperplastic Vitreous: An Unusual Case Associated with a Dysplastic Retine, by Paul J. Baloglou; and Calif. Univ. School of Medicine, San Francisco; Diffuse Melanoma of the Iris, With Extrabulbar Extension Via the Optic Nerve, by W. H. Spencer. Pub. in Clinical Pathology Conference p355-71 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Eye, Pathology), (*Ophthalmology, Symposia), Hemolysis, Hemorrhage, Diagnosis, Organic pigments, Histological techniques, Retina, Blindness, Excision, Optic nerve, Necrosis, Neoplasms, Visual inspection

A case of acute, open angle secondary glaucoma is presented, in which obstruction of the aqueous outflow channels by hematogenous debris and pigment containing macrophages is believed to have been responsible for the sudden rise in intraocular pressure. This has been termed 'hemolytic glaucoma' because of the similarity between its pathogenetic mechanism and that operative in phacolytic glaucoma. (Hemolytic Glaucoma) A blind eye with leukokoria diagnosed clinically as a case of persistent hyperplastic vitreous (PHV) was enucleated because a retinoblastoma could not be excluded. The histopathologic findings are reported and the unusual occurrence of a dysplastic retina in an eye with PHV is discussed. (Persistent Hyperplastic Vitreous) A diffuse necrotic melanoma of the iris and ciliary body produced heterochromia with hyperchromia of the affected iris and secondary glaucoma in a 44-year-old white man. The tumor was followed for 13 years without a definite diagnosis. Following enucleation the tumor presented with gross extrabulbar extension via the optic nerve. On microscopic examination a diffuse necrotic tumor of the iris and ciliary body was found to have dispersed itself throughout the vitreous, the inner aspects of the retina, the optic nerve head and the optic nerve. (Diffuse Melanoma of the Iris).

**AD-623 039 Div. 16/10**
*ARMED FORCES INST OF PATHOLOGY WASHINGTON D C*
**SYMPATHETIC OPHTHALMIA: A REPORT OF A CASE WITH ONSET 18 YEARS AFTER CONTUSION WITH UNSUSPECTED SCLERAL RUPTURE,**
by Walter R. Stafford. 1963, 7p.

Unclassified report

Pub. in Survey of Ophthalmology v10 n3 p232-7 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Eye, Pathology), Wounds + injuries, Tissues (Biology), Cornea, Medical examination, Visual inspection, Histological techniques, Neoplasms, Diagnosis, Ophthalmology

A case of sympathetic ophthalmia, originally thought to have occurred after a contusion of the eye without penetrating injury, is shown to have been the result of a scleral perforation with incarceration of uveal tissue. It is concluded that thorough study of serial sections of the eye is absolutely essential to the proof of sympathetic ophthalmia without penetrating injury. (Author)

**AD-623 042 Div. 16/1 ,16/10**
*ARMY MEDICAL RESEARCH AND NUTRITION LAB DENVER COLO*
**RADIATION AND WOUND HEALING: A STUDY OF THE ROLE OF SULFUR AMINO ACIDS,**
by Kenneth E. Kinnamon, and John L. Sutter. 30 Nov 64, 9p.

Unclassified report

Pub. in Radiation Research v25 n3 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Wounds + injuries, Radiation effects), (*Amino acids, Radiation effects), (*Collagen, Radiation effects), (*Radiation effects, Organic sulfur compounds), Rats, Whole body irradiation, Methionine, Sulfates, Tracer studies

Eight hundred rads of whole-body irradiation received by albino rats has not been shown to affect wound regenerate content of total methionine or total cystine. Neither does the acute exposure alter S35-methionine S35-cystine, total sulfur-35, or total sulfur-35 minus S35-sulfate regenerate levels after tracer injections of S35-methionine. The irradiation did, however, cause a reduction in wound collagen content. (Author)

**AD-623 062 Div. 16/1 ,16/12**
*UNIVERSIDAD CATOLICA DE CHILE SANTIAGO LABORATORIO DE NEUROFISIOLOGIA*
**PLASTICITY OF NEURAL FUNCTION IN LEARNING AND RETENTION,**
by J. V. Luco. 1964, 27p. Contract AF AFOSR62 387 Proj. 9777 Task 977701
AFOSR , 65-1501

Unclassified report

Pub. in Proceedings of the Conference (2nd), Los Angeles, Calif., 1962, Univ. of Calif. Press Brazier M A B v2 p13559 1964 UCLA Forum Med Sci n2 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Central nervous system, Learning), (*Learning, Central nervous system), Nerve cells, Ganglia, Nervous system, Neuromuscular transmission, Nerve impulses, Nerve fibers, Retention, Adaptation (Physiology), Fatigue (Physiology), Memory, Inhibition, Stimulation, Physiology, Blattidae

An electrophysical approach to the neural basis of plasticity, defined broadly by the author as the central nervous system's quality of being versatile is discussed. This property of plasticity leaves a trace that in some way means a better adaptation in the future. The in vitro experiment was performed on the sixth abdominal and the metathoracic ganglion of Blatta orientalis. Stimulation of the nerve tracts which connect the ganglion with others elicits several different types of responses, all recorded from the motor fibers and quite frequently from a single unit. The servile response is characterized by fatugue properties the labile response by its variable response to different frequency stimuli, and the intratetanic by the responses elicited after tetanic conditions are introduced. Afterdischarge, delayed, and natural responses are also described. Analysis of the six responses in terms of their plasticity or tendency toward modification by past experience, indicated that the labile response reaction and the intratetanic response are definitely plastic. The servile response is not considered to be versatile because it shows no post-tetanic potentiation in the cockroach. Since post-tetanic potentiation is considered to be the simplest form of memory, it is thus a sign of plasticity. (Author)

**AD-623 066 Div. 16/1**
*RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE*
**STIMULUS CODING IN THE COCHLEAR NUCLEUS,**

by Nelson Y. S. Kiang, Russell R. Pfeiffer, W. Bruce Warr, and Ann S. N. Backus. 26 May 65, 23p. Contract DA36 039AMC03200E Grant, NSF GP2495

Unclassified report

Pub. in Annals of Otology, Rhinology and Laryngology v74 n2 p463 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ear, Nuclei (Biology)), (*Nuclei (Biology), Ear), (*Auditory nerve, Stimulation), Anatomy, Physiology, Nerve fibers, Nerve cells, Auditory signals, Hearing, Histology, Cats

The purpose of this paper is to examine evidence for the proposition that units in different subdivisions of the cochlear nucleus have characteristically different discharge patterns. The cat was chosen as the appropriate animal for study primarily because its cochlear nucleus has been studied in detail by anatomists. A secondary advantage is that some of the discharge characteristics of units in the cat's cochlear nucleus have already been described. The present report may be regarded as one of a continuing series of studies on the cochlear nucleus.

**AD-623 079 Div. 16/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF*
**URETHAN-INDUCED LUNG TUMORS IN MICE: X-RADIATION DOSE DEPENDENT INHIBITION,**
by William A. Foley, and Leonard J. Cole. 22 Sep 65, 15p. Rept. no. USNRDL-TR-911
Proj. MR005 08 1200 Task MR005 08 1200 2
NAVMED , MR005.08-1200

Unclassified report

Descriptors: (*Radiation effects, Lungs), (*Neoplasms, Lungs), (*Radiological dosage, Neoplasms), Whole body irradiation, X-rays, Cancer, Cells (Biology), Inhibition, Mice

Adult male LAF sub 1 mice received single whole-body X ray exposures of 100, 300, 500, or 700 rads, followed one day later by single injections of urethan (1 mg/g). The mice were sacrificed 25 weeks later, and the lungs examined grossly and microscopically for tumors. All of the mice in group receiving 100 rad plus urethan exhibited lung tumors (alveologenic carcinomas), with a mean of 3.1 tumors per mouse. This lung tumor incidence was identical with that occurring in the mise which received urethan only. However, a definite reduction in lung tumor incidence and number of tumors per mouse was observed at the 500 rad dose (66% incidence and 1.8 tumors per mouse, respectively) and at 700 rad (59% incidence and 1.3 tumors per mouse). Thus, the X radiation suppression of urethan-induced lung tumors in mice is dose-dependent in the range of 500 rad to 900 rad. The data suggest that this tumor suppression is correlated with a direct radiation inhibition of alveolar cell proliferation. (Author)

**AD-622 350** **See Fld. 6/5**

**AD-622 438** **See Fld. 6/3**

**AD-622 443** **See Fld. 22**

**AD-622 498** **See Fld. 6/3**

**AD-622 960** **See Fld. 6/3**

**AD-622 988** **See Fld. 9/2**

**AD-623 086** **See Fld. 20/1**

## 7/1. CHEMICAL ENGINEERING

**AD-622 729 Div. 4/1 ,13/3 ,13/7**
*ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS*
**THE UTILIZATION OF SOLAR ENERGY IN A MULTIPLEEFFECT DESALINIZATION SYSTEM,**
by Carl N. Hodges, T. Lewis Thompson, John E. Groh, and William D. Sellers. 5 Jun 64, 8p. Rept. no. 142
Contract 14 01 0001 247

Unclassified report

Pub. in Journal of Applied Meteorology v3 n5 p505-12 Oct 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Desalination, Solar radiation), (*Solar radiation, Desalination), (*Solar furnaces, Distilling plants), (*Distilling plants, Solar furnaces), Seawater, Water supplies, Distillation, Evaporators, Condensers (Liquefiers), Chemical engineering

The University of Arizona has developed a sea water desalinization system which can economically utilize low temperature solar energy. The system consists of a horizontal plastic-covered solar collector, a packedtower evaporator, and a finned-tube surface condenser. Incoming sea water is preheated in the surface condenser and then pumped to the solar collector where it is heated 5 to 10C. The heated sea water is pumped from the collector to the packed-tower evaporator, where a small fraction is evaporated into a circulating air stream and condensed as distilled water in the finned-tube surface condenser. To evaluate the system a pilot plant has been constructed in cooperation with the University of Sonora at Puerto Penasco on the Gulf of California. This plant is designed to produce between 2500 and 5000 gallons of fresh water daily. The energy for evaporation in the system is derived from ocean water heated in the solar collector during the day. In order to allow design optimization for the entire plant the temperatures in the collector must be accurately predicted. It is shown that this can be done by a simple manipulation of the energy balance equation for the collector. The resulting theory is applied to a number of cases involving a double glazing collector filled with 2 inches of water. Such a collector will utilize about 24 per cent of the available solar energy if the warm water in the collector in the late afternoon is flushed out and stored for nighttime use in the evaporator. (Author)

**AD-622 470** **See Fld. 21/4**

**AD-622 557** **See Fld. 13/2**

**AD-622 916** **See Fld. 10/3**

## 7/2. INORGANIC CHEMISTRY

**AD-622 461 Div. 4/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**SPECTROPHOTOMETRIC INVESTIGATION OF REACTION OF NIOBIUM AND TANTALUM WITH SALICYLHDROXAMIC ACID,**
by I. P. Alimarin, and N. P. Borzenkova. 12 Oct 65, 13p. Rept. no. FTD-TT-65-920
TT , 65-64186

Unclassified report

Unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 2: Khimiya (USSR) v18 n6 p65-9 1963.

Descriptors: (*Tantalum, Determination), (*Niobium, Determination), Hydroxamic acid, Salicylic acids, Spectroscopy, Absorption spectrum, Sulfuric acid, USSR

A method is described whereby the amount of niobium in the presence of tantalum may be determined by measurement of the absorption spectrum. Salicylohydroxamic acid is used, and the solution may be strongly acidic with H2S04. The strongly acidic solutions are convenient for determination of niobium in alloys.

**AD-622 532 Div. 4/2 ,4/4**
*GATES AND CRELLIN LABS OF CHEMISTRY CALIF INST OF TECH PASADENA*
**THIN-LAYER CHRONOPOTENTIOMETRIC DETERMINATION OF REACTANTS ADSORBED ON PLATINUM ELECTRODES,**
by Arthur T. Hubbard, and Fred C. Anson. 20 Oct 64, 2p. Contract DA31 124ARO D102
AROD , 3406:8

Unclassified report

Pub. in Journal of Electroanalytical Chemistry v9 p163-4 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrochemistry, Instrumentation), (*Iodides, Quantitative analysis), (*Quantitative analysis, Electrochemistry), (*Electrodes, Adsorption), Films, Platinum, Voltage, Micrometers

A method is described for the quantitative measurement of adsorbed reactants. The apparatus employed involves two platinum electrodes mounted on a micrometer (described in detail in Anal. Chem. 36:723, 1964). An example is given of its application to the determination of iodide and tri-iodide adsorbed on platinum.

**AD-622 692 Div. 4/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*OHIO STATE UNIV COLUMBUS AERONAUTICAL AND ASTRONAUTICAL RESEARCH LABS*
**THE CATALYTIC DECOMPOSITION OF NITROUS OXIDE AND THE THERMAL DECOMPOSITION OF NITROGEN DIOXIDE.**
Technical rept.,
by E. Stokes Fishburne, Daniel M. Bergbauer, and Rudolph Edse. Aug 65, 39p. Rept. no. TR-4
Contract AF33 657 8951 Proj. 7065 Task 706501
ARL , 65-169

Unclassified report

Descriptors: (*Nitrogen compounds, Oxides), (*Oxides, Nitrogen compounds), (*Decomposition, Nitrogen compounds), Catalysis, Thermal properties, Dioxides, Reaction kinetics, Wind tunnels

The reaction between atomic oxygen and nitrous oxide has been studied at temperatures ranging from 1500K to 2100K. To determine the amount of atomic oxygen released in the thermal decomposition of nitrogen dioxide it was necessary to study this decomposition in detail. This study was conducted also at temperatures ranging from 1500K to 2000K and over a wide range of concentrations and pressures. The reaction rates obtained for the various steps in the decomposition of nitrogen dioxide are in general agreement with those obtained by other investigators. The reaction of nitrous oxide in the presence of nitrogen dioxide with argon as the diluent was studied to determine if the oxygen released in the decomposition of nitrogen dioxide would accelerate the decomposition of nitrous oxide. No noticable acceleration was observed. Many experiments were conducted with a nitrous oxide mole fraction of 0.02 and ozone mole fractions varying between 0.005 and 0.06. In these experiments the diluent was molecular oxygen. The presence of atomic oxygen definitely produced an increase in the rate of decomposition of nitrous oxide. It is found that the reaction between atomic oxygen and nitrous oxide is pressure dependent. It is shown that the different rate constants obtained by other investigators may be

reasonably explained on the basis of a pressure dependent step in the reaction mechanism. (Author)

**AD-622 854 Div. 4/2 ,4/4**
*DARTMOUTH COLL HANOVER N H DEPT OF CHEMISTRY*
**THE POLARIZABILITIES AND DIAMAGNETIC SUSCEPTIBILITIES OF POLYHEDRAL BORANES AND HALOBORANES,**
by Alexander Kaczmarczyk, and Gerald B. Kolski. 9 Dec 64, 7p. Contract AF AFOSR589 64 Proj. 9710 Task 971002
AFOSR , 65-1369
Unclassified report

Pub. in Inorganic Chemistry v4 n5 p665-71 May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Boranes, Electromagnetic properties), Halogen compounds, Chlorine compounds, Bromine compounds, Decaboranes, Polarization, Dipole moments, Magnetic properties, Ions, Refractive index, Atomic orbitals

The electronic polarizabilities of the B10Cl10 (-2), B10Br10 (-2), B12H12 (-2), B12Cl12 (-2), B12Br12 (-2), and B20H18 (-2) ions were determined and an attempt was made to relate them to the structural features of these ions. From the magnetic susceptibilities of the B10H10 (-2) and B20H18 (-2) ions a Pascal constant was derived for boron in these systems and used to estimate the magnetic susceptibilities of the above listed hydrides and halides. These estimated values were compared and found to be in good agreement with magnetic susceptibilities calculated from the experimental polarizabilities. The great success of a conducting-sphere model in accounting for the physical properties of these ions is demonstrated, and simple general equations for calculating the polarizabilities and magnetic susceptibilities of polyhedral ions are derived. (Author)

**AD-622 931 Div. 4/2**
*MCMASTER UNIV HAMILTON (ONTARIO) DEPT OF METALLURGY AND METALLURGICAL ENGINEERING*
**THE REACTION OF ZIRCONIUM WITH CARBON DIOXIDE AND CARBON MONOXIDE AT 850C,**
by R. J. Hussey, and W. W. Smeltzer. 16 Nov 64, 9p.
Unclassified report

Pub. in Journal of the Electrochemical Society v112 n6 p554-60 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Zirconium, Oxidation), (*Oxidation, Zirconium), Carbon dioxides, Monoxides, Hightemperature research, Phase studies, Microstructure, Carbon compounds, Reaction kinetics

An investigation has been made of the kinetics, the chemistry, and the solid-state processes for the reaction of zirconium with carbon dioxide and carbon monoxide at 850C. In carbon dioxide at 10 cm Hg pressure, the kinetic curve showed an initial decreasing rate, an intermediate increasing rate, and a final decreasing rate. The ratio of carbon to oxygen uptake by zirconium in carbon dioxide was dependent on time and varied from 0.19 to 0.04 over a period 1-48 hr. Carbon produced in the early stages of reaction was incorporated into the oxide and led to formation of a needle-like phase of a ternary lower oxide or a solid solution at the metal/oxide interface. Due to a high ratio of carbon to oxygen uptake in carbon monoxide, this phase developed to a distinct intermediate layer between the oxide scale and metal substrate. The kinetic curves in this gas exhibited a continuously decreasing oxidation rate; eventually breakaway occurred, possibly due to the presence of the secondary phase at the metal-oxide interface. In the range of parabolic oxidation for both carbon dioxide and carbon monoxide, the rates were similar in magnitude to that found in oxygen. Comparison of oxygen gradients demonstrated that the extent of oxygen solution in the metal was the same for oxidation in these gases. (Author)

**AD-622 323** **See Fld. 20/2**

**AD-622 338** **See Fld. 20/6**

**AD-622 397** **See Fld. 20/12**

**AD-622 648** **See Fld. 20/12**

**AD-622 679** **See Fld. 4/2**

**AD-622 722** **See Fld. 7/3**

**AD-622 751** **See Fld. 7/4**

**AD-622 754** **See Fld. 7/4**

**AD-622 756** **See Fld. 7/4**

**AD-622 771** **See Fld. 7/3**

**AD-622 809** **See Fld. 11/6**

**AD-622 840** **See Fld. 7/3**

**AD-622 880** **See Fld. 7/4**

**AD-622 906** **See Fld. 7/4**

**AD-622 962** **See Fld. 7/4**

## 7/3. ORGANIC CHEMISTRY

**AD-622 450 Div. 4/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**METHOD OF OBTAINING N-FLUOROVINYL COMPOUNDS,**
by A. Ya. Yakubovich, and A. P. Sergeev. 21 Sep 65, 8p. Rept. no. FTD-TT-65-523
TT , 65-64175
Unclassified report

Unedited rough draft trans. of Russian patent 166 660, appl. 848911/23-4, 24 Jul 63, 1p.

Descriptors: (*Organic nitrogen compounds, Synthesis (Chemistry)), (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Fluorine compounds, Halogenated hydrocarbons), Metalorganic compounds, Alkenes, Amines, Piperidines, Patents, USSR

The object of the invention is a method for obtaining nfluorovinyl compounds, which has the distinguishing feature that fluorinated olefins are subjected to interaction with N-metallic products of the general formula RR'NMe. (Author)

**AD-622 476 Div. 4/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**COVALENT METALLORGANIC COMPOUNDS OF TRANSITION ELEMENTS,**
by G. A. Razuaev, and V. N. Latyaeva. 20 Sep 65, 26p. Rept. no. FTD-TT-65-1263
TT , 65-64199
Unclassified report

Unedited rough draft trans. of Uspekhi Khimii (USSR) v34 n4 p586-97 1965.

Descriptors: (*Metalorganic compounds, Transition elements), (*Transition elements, Metalorganic compounds), Titanium compounds, Synthesis (Chemistry), Catalysts, Polymerization, Catalysis, Grignard reactions, Thermal properties, Halogenated hydrocarbons, Grignard reagents, Oxidation, Reduction (Chemistry), USSR

**AD-622 499 Div. 4/3 ,4/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF*
**A KINETIC STUDY OF THE KHARASCH REACTION.**
Master's thesis,
by Robert L. Whittaker. 1964, 41p.
Unclassified report

Descriptors: (*Grignard reagents, Chemical reactions), (*Metalorganic compounds, Chemical reactions), (*Halogenated hydrocarbons, Chemical reactions), Reaction kinetics, Catalysts, Cobalt compounds, Chlorides, Bromides, Iodides

A kinetic study was conducted of the reaction between organometallics and organic halides under cobaltous halide catalysis. Possible mechanisms of the reaction are discussed using experimental data. Rate expressions are derived from previously postulated mechanisms and compared to the experimentally derived rate expression. (Author)

**AD-622 503 Div. 4/3 ,4/4**
**CFSTI Prices: HC $3.00 MF $0.50**
*MONSANTO RESEARCH CORP EVERETT MASS BOSTON LAB*
**CHEMILUMINESCENT SYSTEMS.**
Technical rept. no. 5, 1 Jun-31 Aug 65,
by A. W. Berger, and J. A. Pirog. 30 Sep 65, 56p. Rept. no. MRB3009Q5
Contract Nonr451100 Proj. NR356 464 ,ARPA Order299
Unclassified report

See also AD-617 104.

Descriptors: (*Luminescence, Organic materials), (*Indoles, Luminescence), (*Photochemistry, Indoles), Brightness, Oxidation, Organic solvents, Spectroscopy, N-heterocyclic compounds, Carboxylic acids, Ketones, Aromatic compounds, Pyrroles, Fluorescence, Catalysis, Instrumentation, Amides

Maximum brightness and efficiency of the chemiluminescent autoxidation of indoles in basic solution in polar aprotic solvents is found for the 5- and 6-substituted skatoles. 2,3-Dimethylindole-5-carboxylic acid yields greater peak brightness than skatole at the standard 0.005 M concentration in DMSO, although with lower efficiency than skatole. The fluorescence spectrum of a basic solution of orthoacetamido acetophenone, in DMSO, matches the chemiluminescence emission spectrum of 2,3-dimethylindole in peak wavelength and contour. (Author)

**AD-622 521 Div. 4/3**
**CFSTI Prices: HC $3.00 MF $0.75**
*MELLON INST PITTSBURGH PA*
**FAR INFRARED TORSIONAL AND BENDING VIBRATIONS OF BENZALDEHYDES, PYRIDINE CARBOXALDEHYDES, ACETOPHENONE, STYRENE AND THEIR HALOGEN DERIVATIVES. THE CALCULATION OF BARRIER HEIGHT TO INTERNAL ROTATION.**
Technical documentary rept. for Jun 64-Jun 65,
by William G. Fateley, Foil A. Miller, and Robert

E.Witkowski. Aug 65, 68p. Contract AF33 657 11142 Proj. 7367 Task 736702
ML , TDR-64-158, pt. 2

Unclassified report

See also AD-605 410.

Descriptors: (*Aromatic compounds, Spectra (Infrared)), (*Infrared spectroscopy, Aromatic compounds), Aldehydes, Pyridines, Halogen compounds, Chemical bonds, Vibration, Programming (Computers), Interferometers, Water, Polyethylene plastics, Crystals, Quartz, Silicon

The far infrared spectra of benzaldehyde, pyridine carboxaldehydes, acetophenone, styrene, nitrobenzene, and some of the halogen derivatives have been investigated. Torsional vibrations have been assigned and barriers to internal rotation have been calculated for the C-C single bond. Results are given on the shift in frequency resulting from changes from liquid to vapor phase as well as reporting the differences in the calculated barrier height. Experimental evaluation of the interferometer's performance is reported. The computed program for taking the Fourier transpose of the interferogram is given. The transmission of many available commercial crystals and polyethylenes are also reported. (Author)

**AD-622 577 Div. 4/3 ,4/4**
*EDWARD DAVIES CHEMICAL LAB UNIVERSITY COLL OF WALES ABERYSTHWYTH*
**PYROLYSES OF NN-DIMETHYLANILINE, CUMENE, AND PHENYLHYDRAZINE, AND BOND STRENGTHS IN AROMATIC AMINOCOMPOUNDS,**
by J. A. Kerr, A. F. Trotman-Dickenson, and Margaret Wolter. 13 Jan 64, 5p. Contract AF EOAR23 63
AFOSR , 65-1474

Unclassified report

Pub. in Journal of the Chemical Society v693 p3584-8 Oct 1964 (Copies available only to DDC users).

Descriptors: (*Organic nitrogen compounds, Pyrolysis), (*Polycyclic compounds, Pyrolysis), (*Hydrazine derivatives, Pyrolysis), (*Pyrolysis, Reaction kinetics), Aromatic compounds, Amines, Chemical bonds, Heat of formation, Great Britain

Pyrolyses of NN-dimethylaniline, cumene, and phenylhydrazine were studied by the aniline-carrier technique and found to be first-order homogeneous reactions with the following rate constants: NN-dimethylaniline (552-681) log k (/sec.) = 12.9 - (57,000/2.3RT); cumene (619-716C) log k = 14.3 - (66,000/2.3RT); phenylhydrazine (325-437) log k = 11.8 - (40,000/2.3RT). From the first two values it is deduced that methyl substitution has about the same weakening effect on N-C and N-H bond strengths in anilines as on the corresponding C-C and C-H bonds in alkylbenzenes. The heat of formation of the amino-radical derived from the pyrolysis of phenylhydrazine agrees with a revised figure (39.3 kcal./mole) from the pyrolysis of hydrazine. (Author)

**AD-622 594 Div. 4/3 ,4/4**
*UTAH STATE UNIV LOGAN DEPT OF CHEMISTRY*
**THE HEATS OF COMBUSTION OF ACENAPHTHENE, ACENAPHTHYLENE, AND FLUORANTHENE. STRAIN AND DELOCALIZATION IN BRIDGED NAPHTHALENES,**
by Richard H. Boyd, Ross L. Christensen, and Rita Pua. 21 Apr 65, 6p. Contract DA ARO D31 124G 430
AROD , 4150:3

Unclassified report

Pub. in Journal of the American Chemical Society v87 n16 p3556-9 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Polycyclic compounds, Heat of reaction), (*Aromatic compounds, Heat of reaction), Thermochemistry, Chemical bonds, Heat of formation, Vaporization, Calorimeters, Vapor pressure, Combustion

The heats of formation of solid and gaseous acenaphthene, acenaphthylene, and fluoranthene were determined via their heats of combustion and their heats of vaporization. The heats of combustion were determined in an aneroid oxygen bomb calorimeter. A simplified method of calculating the gas compression term in the correction of the heat of combustion to standard states is presented. The heats of vaporization were derived from vapor pressure curves determined by an effusion cell technique. Thermochemical stabilization energies relative to appropriate reference structures indicate that in acenaphthene the bridging ring is strained to the extent of 6-7 kcal. /mole-; in acenaphthylene the bridging ring strain is nearly balanced by the stabilizing interaction of the double bond with the naphthalene nucleus with a net strain of about 2 kcal. /mole-; in fluoranthene the ring strain predominates and there is a net strain of 6-7 kcal/mole-.

**AD-622 637 Div. 4/3**
*FORDHAM UNIV NEW YORK DEPT OF CHEMISTRY*
**THE DIMETHYL SULFOXIDE OXIDATION OF 2,3-BIS (BROMOMETHYL) QUINOXALINE,**
by Emil J. Moriconi. 14 Dec 64, 7p. Contract AF AFOSR62 18
AFOSR , 65-1452

Unclassified report

Pub. in the Journal of Organic Chemistry v30 p1542-7 May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*N-heterocyclic compounds, Oxidation), (*Bromine compounds, N-heterocyclic compounds), (*Sulfoxides, Reduction (Chemistry)), Organic sulfur compounds, Iodine compounds, Aldehydes, Synthesis (Chemistry)

The reaction of 2,3-bis (bromomethyl) quinoxaline (1) with dimethyl sulfoxide produced in varying amounts 3methyl- (2), 3-bromomethyl- (3), and 3 - dibromomethyl - 2quinoxalinecarboxaldehyde (4), in addition to 2,3-bis (dibromomethyl) quinoxaline (5), and 2,3-quinoxalinedicarboxaldehyde (6) isolated as the intramolecular hemigydrate 7. A similar oxidation of 2,3-bis (iodomethyl) quinoxaline (8) led to 2 and 3-iodomethyl-2-quinoxalinecarboxaldehyde (9). The Hunsberger and Tien general mechanism of dimethyl sulfoxide oxidation can account for the formation of all these products, whose structures and mode of formation were independently verified by the chemical interconversion of 1, 3, 4, 6-9, and 13. In the presence of the nonalkaline, hydrogen bromide scavenger, 1,2-epoxy-3-phenoxypropane, dimethyl sulfoxide oxidation of 1 and 8 led to compounds tentatively identified as dl1,2-dibromo- (10) and dl-1,2-diiodo-1,2-bis (3-methyl-2quinoxalyl)ethane (11). Both 10 and 11 were dehalogenated to trans-1,2-bis (3-methyl-2-quinoxalyl)ethylene (12) whose structure was determined by ozonolysis to 2 and by synthesis from 2,3-dimethylquinoxaline (13) and 2. Bromination of 12 led to meso-1,2-dibromo-1,2-bis (3-methyl-2-quinoxalyl) ethane (14). Dimethyl sulfoxide oxidation of 10, 11, and 14 led to the same product, bis (3-methyl-2-quinoxalyl) glyoxal (15). (Author)

**AD-622 722 Div. 4/3 ,4/2 ,30/3**
*AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO*
**A THREE-COLUMN, TWO-DETECTOR GAS CHROMATOGRAPHIC METHOD FOR THE SIMULTANEOUS ANALYSIS OF A MIXTURE OF FIXED GASES AND HYDROCARBONS,**
by J. O. Terry, and J. H. Futrell. 1965, 5p. Rept. no. ARL-65-175

Unclassified report

Pub. in Journal of Analytical Chemistry v37 p1165-7 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrocarbons, Chromatographic analysis), (*Chromatographic analysis, Instrumentation), Aliphatic compounds, Separation, Recording systems, Automatic, Mixtures, Oxygen, Nitrogen

The analytical method described differs from those previously described in that it is possible to display on a single recorder the analysis of a mixture containing C2-C6 hydrocarbons plus nitrogen and oxygen and to obtain quantitative analytical results with automatic integration of peak areas. Higher boiling compounds are resolved in short times without drastic temperature changes during the analysis and without sacrificing resolution or analytical accuracy. The technique uses a commercially available gas chromatograph to which two additional columns and a detector are connected in series. The principle of operation is that the dual column chromatograph performs in its usual manner with a column chosen for its ability to separate the high boiling components within a reasonable time. The unresolved low boiling constituents and fixed gases pass into a second column which will separate the low molecular weight hydrocarbons efficiently at room temperature. The fixed gases are then passed into an adsorption column, maintained at room temperature, in which they are separated and detected by the reference side of the second detector.

**AD-622 727 Div. 4/3**
*DEFENCE CHEMICAL BIOLOGICAL AND RADIATION LABS OTTAWA (ONTARIO)*
**CYCLOHEXANE COMPOUNDS. V. THE REACTION OF 1-METHOXYCYCLOHEXENE-2 WITH AQUEOUS N-BROMOSUCCINIMIDE. THE 1-METHOXY-2-BROMO3-HYDROXYCYCLOHEXANES,**
by R. A. B. Bannard, A. A. Casselman, and L. R.Hawkins. 6 Apr 65, 13p. Rept. no. DCBRL-457

Unclassified report

Pub. in Canadian Journal of Chemistry v43 p2398407 1965 (Copies available only to DDC users). See also AD-617 504.

Descriptors: (*Cyclohexanes, Chemical reactions), (*Cyclohexanols, Synthesis (Chemistry)), (*Cyclohexanes, Synthesis (Chemistry)), (*Stereochemistry, Cyclohexanes), Ethers, Bromine compounds, Succinates, Halohydrins, Molecular isomerism, Chromatographic analysis

Interaction of 1-methoxycyclohexene-2 and aqueous Nbromosuccinimide gave a mixture of stereoisomeric bromohydrins, which, on treatment with aqueous sodium hydroxide, furnished 1-beta-methoxy-2-alpha, 3-alphaepoxycyclohexane (I) and 1-alpha-methoxy-2-alpha, 3alpha-epoxycyclohexane (II) in the ratio 3:1. The mixture from the N-haloimide-olefin reaction was separated by preparative vapor phase chromatography into three isomeric bromohydrins, 1-alpha-methoxy-2-alphahydroxy-3-beta-bromocyclohexane (IV), 1-alpha-methoxy 2-alpha-bromo-3-beta-hydroxycyclohexane (V), and 1-alpha-methoxy-2-beta-bromo-3-alpha-hydroxycyclohexane (VI) in the relative proportions 1:10:4. The 3bromo isomer IV was identified by comparison with an authentic specimen prepared by the action of hydrobromic acid on the oxide II. Compounds V and VI were shown to have the indicated structures by deetherification to the corresponding bromodiols VII and VIII in high yield, followed by debromination of the latter to trans- and cis1,3-cyclohexanediol respectively. The product distribution is considered in relation to the intervention of electronic and steric factors in a possible mechanism suggested for the reaction between aqueous N-bromosuccinimide and 1-methoxycyclohexene-2. (Author)

AD-622 752 Div. 4/3 ,4/4
*EDWARD DAVIES CHEMICAL LAB UNIVERSITY COLL OF WALES ABERYSTHWYTH*
**THE REACTIONS OF METHYL RADICALS WITH FORMAMIDE, N-METHYL AND NN-DIMETHYLFORMAMIDE,**
by L. F. R. Cafferata, J. A. Kerr, and A. F.Trotman-Dickenson. 3 Apr 64, 4p. Contract AF EOAR23 63
AFOSR , 65-1473

Unclassified report

Pub. in Journal of the Chemical Society n242 p1386-9 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Formamides, Dehydrogenation), (*Free radicals, Hydrogenation), (*Dehydrogenation, Reaction kinetics), Ketones, Decomposition, Thermochemistry, Aldehydes, Formates, Great Britain

The following rate constants were obtained for the abstraction of hydrogen atoms from formamides by methyl radicals: formamide (170-247C) log k (mole c.c./sec) = 10.5 - (6,600/2.3 RT); N-methylformamide (161-287C) log k (mole c.c./sec) = 10.9 - (7,600/2.3 RT); NN-dimethylformamide (120-298C) log k (mole c.c./sec) = 11.4 - (8,300/2.3 RT). These results are compared with methyl-radical reactions with aldehydes and formates. (Author)

AD-622 771 Div. 4/3 ,4/2
*NEWCASTLE-UPON-TYNE UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY*
**GALLIUM HYDRIDE ADDUCTS OF TRIMETHYLPHOSPHINE AND TRIPHENYLPHOSPHINE,**
by N. N. Greenwood, E. J. F. Ross, and A. Storr. 13 May 64, 6p. Contract AF EOAR64 79
AFOSR , 65-1276

Unclassified report

Pub. in Journal of Chemical Society v246 p1400-6 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Gallium compounds, Complex compounds), (*Phosphines, Complex compounds), (*Organic phosphorus compounds, Chemical properties), Deuterated compounds, Spectra (Infrared), Chemical bonds, Volumetric analysis, Aluminum compounds, Hydrides, Decomposition, Chemical equilibrium, Nuclear magnetic resonance, Great Britain

The new compounds Me3PGaH3 and Me3PGaD3 were prepared and shown by their gas-phase infrared spectra to be monomeric. The P-Ga stretching frequency was identified at 326/cm. The absence of a 2:1 adduct, (Me3P)2GaH3, was shown by tensiometric titration at -21C. Gas-phase displacement reactions indicate that trimethylamine and trimethylphosphine have similar donor strengths towards gallium hydride. The corresponding aluminium hydride adduct Me3PAlH3 could not be prepared directly, and trimethylphosphine does not displace trimethylamine from Me3NAlH3. The compound Ph3PGaH3 was prepared but readily decomposes at room temperature. The equilibrium between trimethylamine, trimethylphosphine, and their adducts with gallium hydride in benzene solution was investigated by n.m.r. spectroscopy. (Author)

AD-622 840 Div. 4/3 ,4/2
*TEXAS TECHNOLOGICAL COLL LUBBOCK DEPT OF CHEMISTRY*
**THE SOLID STATE REACTION BETWEEN TRIS (ETHYLENEDIAMINE) CHROMIUM (III) COMPLEXES AND ALKALI METAL HALIDES AND THIOCYANATES.**
Revised ed.,
by W. W. Wendlandt, and C. H. Stembridge. 14 Sep 64, 10p. Contract AF AFOSR23 63 Proj. 9762 Task 976203
AFOSR , 65-1218

Unclassified report

Pub. in Journal of Inorganic and Nuclear Chemistry v27 p575-81 1965 (Copies available only to DDC users). Revision of manuscript submitted 9 Jul 64.

Descriptors: (*Chromium compounds, Complex compounds), (*Halides, Chemical reactions), (*Thiocyanates, Chemical reactions), (*Complex compounds, Chemical reactions), Solids, Ammonium compounds, Potassium compounds, Sodium compounds, Chlorides, Fluorides, Bromides, Iodides, Spectroscopy, Synthesis (Chemistry), Ethylenediamine

The solid-state reaction between /Cr (en)3/X3 (X = Cl (-), Br (-), I (-) and SCN (-) and NH4X (X = F (-), Cl (-), Br (-), I (-) and SCN (-)), KX (X = Cl (-), Br (-), I (-)), and NaSCN, was studied by high temperature and dynamic reflectance spectroscopic techniques from ambient to 225C. The reaction product, in most cases, was cis-/Cr (en)2Y2/X, where Y and X are the same or different anions, depending upon the matrix material employed. In an ammonium salt matrix, the ease of anion coordination was: F (-) > SCN (-) > Cl (-) > Br (-); in an alkali metal salt matrix, the order was: SCN (-) > F (-) > Cl (-) > Br (-). The 'thermal matrix' method described appears to offer a useful new route for the synthesis of bis (ethylenediamine) chromium (III) complexes. (Author)

AD-622 847 Div. 4/3 ,4/4
*TEXAS TECHNOLOGICAL COLL LUBBOCK DEPT OF CHEMISTRY*
**THE THERMAL DECOMPOSITION OF METAL ETHYLENEDIAMINE OXALATE COMPLEXES,**
by John M. Haschke, and Wesley W. Wendlandt. 7 Aug 64, 11p. Contract AF AFOSR23 63 Proj. 9762 Task 976203
AFOSR , 65-1217

Unclassified report

Pub. in Analytica Chimica Acta v32 p386-93 1965 (Copies available only to DDC users).

Descriptors: (*Ethylenediamine, Complex compounds), (*Oxalates, Complex compounds), (*Complex compounds, Pyrolysis), (*Pyrolysis, Thermochemistry), Dehydration, Zinc compounds, Cadmium compounds, Copper compounds, Nickel compounds, Cobalt compounds, Gravimetric analysis, Spectroscopy, Reaction kinetics, Heat of reaction

The thermal dehydration and deamination of some ethylenediamine complexes of Zn, Cd, Cu, Ni, and Co oxalate were studied by thermogravimetry, differential thermal analysis, differential scanning calorimetry, high temperature reflectance spectroscopy, and gas evolution. The tris (ethylenediamine) complexes deaminated to mono (ethylenediamine) compounds which then decomposed directly to the metal oxide. The kinetics and heats of dehydration and deamination of several of the complexes were determined. (Author)

AD-622 852 Div. 4/3
*YALE UNIV NEW HAVEN CONN DEPT OF CHEMISTRY*
**DECOMPOSITION OF BENZENEDIAZONIUM-3CARBOXYLATE: TRANSIENT 1,3-DEHYDROBENZENE,**
by R. Stephen Berry, John Clardy, and Margaret E.Schafer. 24 Feb 65, 8p. Contract AF AFOSR183 63
AFOSR , 65-1251

Unclassified report

Pub. in Tetrahedron Letters n15 p1011-7 1965 (Copies available only to DDC users).

Descriptors: (*Aromatic compounds, Decomposition), (*Monocyclic compounds, Mass spectrum), Molecular isomerism, Organic nitrogen compounds, Salts, Band spectrum, Photochemistry

The mass spectrum and the optical spectrum were studied as functions of time for the process and products of flashinitiated decomposition of benzenediazonium-3-carboxylate. The products of decomposition include a transient parent C6H4 species of mass 76. The fragmentation pattern and its time dependence show that the mass 76 species is different from either of those obtained from the ortho or para isomers of the precursor. Comparison of the fragmentation pattern with model compounds suggests that 1,3-dehydrobenzene probably in a singlet state, is the most likely assignment of the species. Two structural representations are proposed. (Author)

AD-622 904 Div. 4/3
*MELLON INST PITTSBURGH PA*
**REACTIONS OF ALKALI METAL DERIVATIVES OF METAL CARBONYLS. VI. SOME REACTIONS OF ANIONS PREPARED FROM INDENYLMOLYBDENUM TRICARBONYL DIMER AND AZULENEDIMOLYBDENUM HEXACARBONYL,**
by R. B. King, and M. B. Bisnette. 2 Nov 64, 8p. Contract AF AFOSR580 64
AFOSR , 65-1134

Unclassified report

Pub. in Inorganic Chemistry v4 n4 p475-81 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Molybdenum compounds, Metalorganic compounds), (*Metalorganic compounds, Chemical reactions), Alkali metal compounds, Polycyclic compounds, Ions, Reduction (Chemistry), Halogenated hydrocarbons, Spectra (Infrared), Nuclear magnetic resonance, Spectra (Visible + ultraviolet)

Indenylmolybdenum tricarbonyl dimer, C9H7Mo (CO)3 2, is reduced by sodium amalgam in tetrahydrofuran to give a brown solution containing the C9H7Mo (CO)3 (-) anion. This solution reacts with methyl iodide to form the expected yellow-orange tricarbonyl CH3Mo (CO)3C9H7. However, allyl chloride and chloromethyl methyl sulfide react with the C9H7Mo (CO)3 (-) anion in tetrahydrofuran solution at room temperature to form the yellow dicarbonyls pi-C3H5Mo (CO)2C9H7 and pi-CH3SCH2Mo (CO)2C9H7, respectively, in unusually facile decarbonylation reactions. Treatment of C9H7Mo (CO)3 2 with iodine in dichloromethane solution gives a brown dicarbonyl iodide C9H7Mo (CO)2I rather than the expected tricarbonyl iodide. Azulenedimolybdenum hexacarbonyl, C10H8Mo2 (CO)6, reacts with sodium amalgam in tetrahydrofuran to give a yellow-brown solution which gives yellow dimeric C10H8Mo (CO)3CH3 2 on treatment with methyl iodide. (Author)

AD-623 007 Div. 4/3
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**DIHYDROPYRAN DERIVATIVES OF SECONDARY AROMATIC AMINES.**
Technical rept. for Aug 64-Mar 65,
by Lawrence G. Vaughan, and David N. Kramer. Sep 65, 21p. Rept. no. CRDLR-3326
Task 1C622401A10204

Unclassified report

Descriptors: (*O-heterocyclic compounds, Chemical reactions), (*Amines, Synthesis (Chemistry)), Aromatic compounds, Catalysts, Sulfuric acid, Molecular structure, Spectra (Infrared), Spectra (Visible + ultraviolet), Nuclear magnetic resonance, Decomposition, Alcohols

3, 4-Dihydropyran was found to form N- (2-tetrahydropyranyl) derivatives with a variety of secondary aromatic amines. The reaction is catalyzed by concentrated sulfuric acid. The structures of these compounds were established by infrared, ultraviolet, and nuclear magnetic resonance spec-

troscopy. The derivatives are stable as solids and in basic solution, but are decomposed in the presence of alcohols by traces of acid to regenerate the amines. (Author)

**AD-623 014 Div. 4/3 ,10/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL RESEARCH LAB WASHINGTON D C*
**A STUDY OF THE IONIZATION PRODUCED BY THE CATALYTIC COMBUSTION OF HYDROCARBONS.**
Interim rept.,
by F. J. Woods, M. E. Umstead, and J. E. Johnson.
1 Oct 65, 16p. Rept. no. NRL-6316
Proj. SF013 08 03 4092 ,SP89422
Unclassified report

Descriptors: (*Hydrocarbons, Combustion), (*Gas ionization, Hydrocarbons), (*Gas analysis, Hydrocarbons), (*Chromatographic analysis, Hydrocarbons), Catalysis, Oxidation, Dissociation, Molecular structure, Aliphatic, compounds, Combustion products, Ionic current, Platinum, Heaters

Ionization produced during the catalytic combustion of hydrocarbons was studied for its usefulness in applications such as chromatographic detection. When a platinum filament is heated above 500C in an atmosphere containing the hydrocarbon, the formation of ions takes place during oxidation of the compound. The number of ions produced by the hydrocarbons is an exceedingly small fraction of the number of carbon atoms oxidized and varies widely depending upon the molecular structure of the hydrocarbon and the catalyst temperature. Branched hydrocarbons produce greater ionization than straight-chain compounds, although the ease of oxidation is opposite. Hydrogen and carbon monoxide burned in the combustion cell exhibit no ionization current, even when completely oxidized. Because of the marked effect of molecular structure on ionization and the repsonse of the method to low concentrations of hydrocarbons in air, the procedure may find future use as a specific detector in gas chromatography. (Author)

**AD-623 071 Div. 4/3**
*ILLINOIS UNIV URBANA DEPT OF CHEMISTRY AND CHEMICAL ENGINEERING*
**ORGANOMETALLIC COMPOUNDS. IV. PHENYLTIN CLEAVAGE BY CHELATING AGENTS,**
by W. H. Nelson, and D. F. Martin. 2 Dec 64,
8p. Contract DA31 124ARO D52
AROD , 3717:5
Unclassified report

Pub. in Journal of Organometallic Chemistry, v4 p67-73 1965. (Copies available only to DDC users). See also AD-619 239.

Descriptors: (*Metalorganic compounds, Tin compounds), (*Tin compounds, Decomposition), (*Complex compounds, Synthesis (Chemistry)), Aromatic compounds, Chlorides, Absorption spectrum, Ketones, Aldehydes, Alcohols

Acetylacetone, benzoylacetone, dibenzoylmethane, salicylaldehyde, and 8-quinolinol react with diphenyltin dichloride to produce tin-phenyl cleavage products of the type Cl2Sn (Ch)2, where HCh is a bidentate, monoprotic chelating agent. Two quadridentate diprotic ligands of the type H2Ch' react with diphenyltin dichloride under similar conditions to give products of the general type Cl2SnCh'. (Author)

**AD-622 341** **See Fld. 6/1**

**AD-622 351** **See Fld. 11/9**

**AD-622 435** **See Fld. 11/7**

**AD-622 447** **See Fld. 11/9**

**AD-622 449** **See Fld. 11/9**

**AD-622 674** **See Fld. 7/4**

**AD-622 700** **See Fld. 7/4**

**AD-622 719** **See Fld. 10**

**AD-622 785** **See Fld. 21/9**

**AD-622 850** **See Fld. 7/4**

**AD-622 962** **See Fld. 7/4**

## 7/4. PHYSICAL CHEMISTRY

**AD-622 343 Div. 4/4 ,25/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**OSCILLATORY SPECTRUM OF COMBINED DIFFUSION OF GASEOUS NF3,**
by Yu. I. Kotov, and V. M. Tatevskii. 22 Sep 65,
6p. Rept. no. FTD-TT-65-781
TT , 65-64128
Unclassified report

Unedited rough draft trans. of mono. Optika i Spektroskopiya: Sbornik Statei. Vol. 2, Molekularnaya Spektroskopiya, Moscow, 1963, p305-6.

Descriptors: (*Nitrogen compounds, Fluorides), (*Raman spectroscopy, Nitrogen compounds), (*Spectra (Infrared), Nitrogen compounds), Absorption spectrum, Gases, USSR

Investigation of the spectrum of combined diffusion of gaseous NF3 was conducted with the aid of a multipasstype vessel. Two of the bands are wide ones: nu4 = 495/cm and nu3 = 911/cm, confirming their designation to degenerated (incompletely symmetrical) oscillations of the NF3 molecule. Two other bands (nu1 = 1033/cm and nu2 = 646/cm) appear to be sharp ones and belong to fully symmetrical oscillations of the NF3 molecule. The frequency values observed are in good agreement with values found earlier from infrared absorption spectra (M.K. Wilson and S. R. Polo, J. Chen. Phys. 20:1716 (1952) and E. L. Pace and L. Pierce, J. Chene. Phys. 23:1248 (1955)).

**AD-622 362 Div. 4/4 ,14/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**HIGH MOLECULAR COMPOUNDS (SELECTED ARTICLES).**
17 Sep 65, 16p. Rept. no. FTD-TT-65-776
TT , 65-64152
Unclassified report

Unedited rough draft trans. of Vysokomolekulyarnye Soedineniya (USSR) v6 n8 p1407-10, 1539 1964.

Descriptors: (*Polymers, Molecular properties), Mechanical properties, Films, Bonding, Glass textiles, USSR

Contents: Nature of destruction of spherulitic structure and its effect on mechanical properties of isotactic polypropylene in a wide range of temperatures, on the grafting of three-dimensional polymers to glass fiber.

**AD-622 388 Div. 4/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**DETECTION OF FREE HYDROGEN AND OXYGEN ATOMS IN A RAREFIED FLAME OF CARBON MONOXIDE AND OXYGEN MIXTURE IN PRESENCE OF SMALL ADMIXTURES OF ETHYLENE,**
by V. V. Azatyan, Yu. M. Gershenzon, A. B.Nalbandyan, and Tsuy-Men Yuan. 17 Sep 65, 7p.
Rept. no. FTD-TT-65-780
TT , 65-64165
Unclassified report

Unedited rough draft trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Izvestiya. Seriya Khimicheskikh Nauk, v16 n3 p201-3 1963. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Carbon compounds, Monoxides), (*Combustion, Carbon compounds), Oxygen, Hydrogen, Atoms, Flames, Paramagnetic resonance, Temperature, Ignition, Reaction kinetics, USSR

The investigation was conducted to check the mechansim of combustion of carbon monoxide in presence of ethylene by detecting free oxygen and hydrogen atoms in it and by measuring their concentration. Experiments were conducted with a stoichiometric mixture of carbon monoxide and oxygen, containing from 0.09 to 2.9% of ethylene. The temperature of the experiments was 670 - 675 degrees, pressure -5 mm Hg. Volumetric rate of the stream was 25 cu cm/sec at normal conditions, which corresponded to a linear rate, equaling 4.4 m/sec under flame conditions. In these conditions EPR signals of hydrogen and oxygen atoms were registered. Concentrations of H and O atoms with increase in ethylene content in the mixture rise at first and then decrease. The hydrogen and oxygen concentration is comparable in value. The initial content of ethylene, at which the concentration of oxygen atoms is maximum, is close to the ethylene concentration, at which the lower limit of spontaneous ignition of the mixture is minimum (0.2%). With a rise in temperature the concentrations of H and O atoms increase, indicating that combustion under experimental conditions is not much greater.

**AD-622 453 Div. 4/4 ,25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PLANT LABORATORY (SELECTED ARTICLES).**
28 Sep 65, 25p. Rept. no. FTD-TT-65-694
TT , 65-64178
Unclassified report

Unedited rough draft trans. of Zavodskaya Laboratoriya (USSR) v30 n6 p675, 725-6, 733-8 1964.

Descriptors: (*Combustion products, Chromatographic analysis), (*Refractory materials, Quantitative analysis), (*Fatigue (Mechanics), Statistical analysis), USSR

Contents: Analysis of products of combustion of methaneair mixture by the gas chromatography method by V. N. Abramov, V. I. Fisak; Quantitative x-ray analysis of carbides and nitrides of titanium, zirconium and hafnium by Yu. V. Levinskiy; Method of estimation of fatigue strength when the process of repeated loading is divided into two stages by R. D. Vagapov.

**AD-622 530 Div. 4/4**
*STEVENS INST OF TECH HOBOKEN N J DEPT OF CHEMISTRY AND CHEMICAL ENGINEERING*
**OBSERVATIONS CONCERNING DIRECTLY AND NONDIRECTLY BONDED 13C-H COUPLINGS WITH RESPECT TO SYMMETRY CONSIDERATIONS,**
by T. Vladimiroff. 6 Apr 65, 1p. Contract DA31 124ARO D90
AROD , 3930:4
Unclassified report

Pub. in Journal of Physical Chemistry v69 p3197 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Chemical bounds, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Chemical bonds), Alkenes, Molecular properties, Stable isotopes

**AD-622 583 Div. 4/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF CHEMISTRY*
**BASIC ATOM CHEMISTRY--SURFACE CATALYZED EXCITATION.**
Final rept. for Sep 62-Aug 64,
by Paul Harteck. Jun 65, 8p. Contract AF AFOSR174 63
AFOSR , 65-1273

Unclassified report

Descriptors: (*Luminescence, Catalysis), (*Oxygen, Excitation), (*Catalysis, Excitation), Atomic energy levels, Catalysts, Nickel, Cobalt, Quartz, Surfaces, Band spectrum, Sulfur compounds, Monoxides, Band spectrum, Reaction kinetics

An investigation was made concerning the production of excited molecules on the surface of a catalyst by recombination of atoms. It was found that catalysts such as nickel and cobalt are effective in producing excited molecules from oxygen and/or nitrogen atoms. In addition even conditioned glass or quartz surfaces frequently and unexpectedly catalyze the formation of excited molecules. Catalyzed excitation of this type was observed when oxygen atoms were present in the gas phase at a total pressure ranging from a few microns to one millimeter. In all atom studies involving reaction kinetics or spectroscopic observations at low pressures, it would appear necessary that caution be taken to assure that the roll of surface catalyst is understood for the particular case consideration.

**AD-622 593 Div. 4/4**
*INSTITUTE FOR MOLECULAR PHYSICS UNIV OF MARYLAND COLLEGE PARK*
**POTENTIAL-ENERGY CURVES FOR CO AND CO (+),**
by Paul H. Krupenie, and Stanley Weissman. 29 Apr 65, 6p. Contract NsG398
AROD , 4251:5

Unclassified report

Pub. in Journal of Chemical Physics v43 n5 p1529-34 Sep 1 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with the National Bureau of Standards, Washington, D. C.

Descriptors: (*Diatomic molecules, Atomic energy levels), (*Carbon compounds, Monoxides), (*Atomic energy levels, Numerical analysis), Atomic orbitals, Electron transitions, Ions, Potential theory, Quantum mechanics

Potential-energy curves for the X1ξ (+), A1Π, 1ξ (-), a3Π, a'3ξ (+), d3 (delta)i and e3ξ (-) electronic states of CO and the X2ξ (+), A2Πi, and B2ξ (+) electronic states of CO (+) have been calculated using a modification of the Rydberg-Klein-Rees method. The curves for the a 3Π, d3 (delta)i, and A 2Πi states, which are intermediate between Hund's Cases (a) and (b), represent fictitious rotationless states calculated using the true Bv. Benesch and co-workers have shown theoretically that this representation is correct for such intermediate cases. The numerical results for the A 2Πi state confirm their conclusions. (Author)

**AD-622 597 Div. 4/4**
*INSTITUTE FOR MOLECULAR PHYSICS UNIV OF MARYLAND COLLEGE PARK*
**HIGHER APPROXIMATIONS IN THE RYDBERGKLEIN-REES METHOD,**
by Joseph T. Vanderslice, Robin Davies, and Stanley Weissman. 6 Jan 65, 2p.
AROD , 4251:4

Unclassified report

Pub. in Journal of Chemical Physics v43 n3 p1075-6 Aug 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atomic energy levels, Numerical analysis), (*Diatomic molecules, Atomic energy levels), Band spectrum, Potential theory, Electron transitions, Integrals

It is shown how the higher-order WKB corrections given by Dunham for his method for calculating potential curves of diatomic molecules (Phys. Rev. 41:721, 1932) may be incorporated into the Rydberg-Klein-Rees method.

**AD-622 620 Div. 4/4 ,25/7**
*NATIONAL MAGNET LAB MASS INST OF TECH CAMBRIDGE*
**NONLINEAR SHIELDING IN RARE-EARTH CRYSTAL FIELD INTERACTIONS,**
by A. J. Freeman, and R. E. Watson. 1965, 1p. Contract AF49 638 1468
AFOSR , 65-1380

Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 p928 Mar 1965 (Copies not available to DDC or Clearinghouse customers) Prepared in cooperation with Bell Telephone Labs., Inc., Murray Hill, N. J.

Descriptors: (*Rare earth, Ions), Magnetic properties, Crystals, Nuclear shell models, Nuclear energy Levels, Nuclear spectroscopy, Cerium, Terbium, Erbium, Thulium, Holmium, Dysprosium, Ytterbium

Configuration interaction methods were used to estimate the leading nonlinear (and linear) shielding terms in a number of ions, Ce (3+), Tb (3+), Er (3+), Tm (3+), Ho (3+), Dy (3+), and Yb (3+). Calculations were carried out as a function of crystalline field strength since the nonlinear shielding is dependent on the strength of the applied external field. Nonlinear shielding of V2 and V4 external fields were determined as a function of atomic number as a function of atomic number as were their effects on apparent V2, V4, and V6 crystal field parameters. From these certain conclusions may be drawn. Antishielding rather than shielding of the V4 field occurs, but only a few percent at most, whereas the V2 field is always shielded. For the heavy rare-earth ions, the shielding effects are much smaller than for the lighter ions, with the apparent V4 and V6 shielding being very small. The most severe nonlinear effects arise when relatively strong V2 and V4 fields contribute to a relatively weak V6 field.

**AD-622 625 Div. 4/4 ,25/8**
*STANFORD UNIV CALIF DEPT OF CHEMISTRY*
**THE THERMODYNAMIC PROPERTIES OF MIXTURES OF SMALL, NONPOLAR MOLECULES,**
by A. Abe, and P. J. Flory. 20 Nov 64, 9p. Contract AF49 638 1341
AFOSR , 65-1450

Unclassified report

Pub. in Journal of the American Chemical Society v87 n9 p1839-46 May 5 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Thermochemistry, Liquids), Enthalpy, Volume, Entropy, Mixtures, Equations of state, Cyclohexanes, Aromatic compounds, Aliphatic compounds, Carbon tetrachloride, Silicon compounds, Titanium compounds, Tin compounds, Chlorides, Methane, Argon, Oxygen, Nitrogen

The excess enthalpies, volumes, and entropies of 23 equimolar binary liquid mixtures for which necessary data are available in the literature are interpreted according to the relationships presented in the preceding paper (JACS 86:3563, 1964). Most of the mixtures comprise pairs of small globular molecules from the group c-C6H12, C6H6, C (CH3)4, CCl4, SiCl4, TiCl4, and SnCl4 or from the condensed gases CH4, Ar, O2, and N2. Also included are mixtures of C6H6 and of c-C6H12 with n-hexane and n-heptane, the benzene-diphenyl system, and two hydrocarbon-fluorocarbon mixtures. Previously unaccounted equation of state terms, which depend on properties of the pure components, make important contributions to each of the excess quantities. Through use of pair interaction parameters chosen to achieve agreement with the observed excess enthalpies, excess volumes are calculated which agree in nearly all cases with those observed within limits set by experimental errors. Although excess entropies calculated on the same basis tend to be somewhat lower than those observed, the agreement is favorable for most systems. Exceptions involve benzene as one component or cyclohexane in admixture with n-alkanes. Because account was taken of equation of state contributions, the present interaction parameters differ from those deduced from experimental results by previous procedures. (Author)

**AD-622 627 Div. 4/4**
*TEXAS UNIV AUSTIN DEPT OF PHYSICS*
**ATOMIC AND MOLECULAR EMISSION IN THE NEGATIVE GLOW OF A HELIUM DISCHARGE,**
by W. B. Hurt, and W. W. Robertson. 7 Aug 64, 6p. Contract AF AFOSR273 64 Proj. 9750 Task 975002
AFOSR , 65-1429

Unclassified report

Pub. in The Journal of Chemical Physics v42 n2 p556-60 Jan 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Helium, Glow discharges), (*Glow discharges, Helium), Cathodes (Electron tubes), Direct current, Recombination reactions, Atoms, Molecules, Ions

The spatial distribution of helium atomic and molecular radiation has been investigated in the negative glow of a dc discharge. The atomic radiation peaks sharply at the cathode edge of the negative glow, the molecular radiation less sharply at a greater distance from the cathode. Microwave quenching indicates that most of the atomic and all of the molecular radiation results from electron-ion recombination processes. The decrease in atomic radiation reflects the decrease in atomic ion concentration which is controlled primarily by diffusion away from the cathode and by three-body conversion to molecular ions. The molecular ions are lost by diffusion and by collisionalradiative recombination to the neutral molecule, with collisional processes predominating. The negative glow can be characterized as a plasma steady in time but with a one-dimensional spatial decay away from the cathode. (Author)

**AD-622 646 Div. 4/4 ,25/8**
*STD RESEARCH CORP PASADENA CALIF*
**ELECTRICAL BREAKDOWN OF GASES AT ELEVATED TEMPERATURES,**
by A. N. Kontaratos, and S. T. Demetriades. 8 Oct 64, 3p. Contract AF49 638 1445 Proj. 9752 Task 975201
AFOSR , 65-1417

Unclassified report

Pub. in The Physical Review v137 n6A pA1685-6 Mar 15 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gas ionization, High-temperature research), Electric fields, Electric discharges, Pressure, Theory, Experimental data

A recently developed analytical expression relating alpha/p with E/p (alpha is the Townsend ionization coefficient, E the applied field strenght, p the pressure) is used in conjunection with an appropriate breakdown criterion to theoretically formulate the experimental Paschen's law. Variations of both temperature and pressure are considered in this derivation. Theoretical and experimental values of both alpha d (d is the length of the discharge gap) and the minimum breakdown voltage for air are in close agreement in the region of validity of the streamer theory, i.e., for pd>500 mm HgXcm. (Author)

**AD-622 657 Div. 4/4 ,30/3**
*RENSSELAER POLYTECHNIC INST TROY N Y*
**THE IODINE LAMP: A LIGHT SOURCE FOR SELECTIVE EXCITATION OF CO,**
by P. Harteck, R. R. Reeves,Jr., and B. A. Thompson. 15 Oct 63, 6p. Contract NsG261 62 ,AF AFOSR174 63

Unclassified report

Pub. in Zeitschrift fur Naturfoschung v19a n1 p2-6 1964 (Copies available only to DDC users).

Descriptors: (*Glow lamps, Iodine), (*Excitation, Carbon compounds), (*Carbon compounds, Monoxides), Photochemistry, Ultraviolet radiation, Carbon dioxide, Planetary atmospheres, Venus

A light source was developed for photochemical studies which emits the 2062 A line of iodine. This lamp was used to study reactions of CO excited in the a3II level. Carbon monoxide was irradiated in an experimental lamp incorporating an arrangement of concentric cylinders. The output of this lamp was 2x10 to the 18th power quanta per second. The CO a3II molecules react to form CO2 with a quantum efficiency between a few tenths and unity. (Author)

**AD-622 674 Div. 4/4 ,4/3**
*MAREMONT CORP PASADENA CALIF RESEARCH DIV*
**CHEMICAL SYNTHESIS WITH ION BEAMS,**
by Stanley Singer, N. G. Kim, A. W. Merkl, and M. Farber. 1964, 7p. Contract AF49 638 913 Proj. 9750 Task 9750 01
AFOSR , 65-1433

Unclassified report

Pub. in the Journal of Physical Chemistry v69 n3 p799-803 Mar 65 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Synthesis (Chemistry), Ion beams), (*Ion beams, Synthesis (Chemistry)), (*Nitrobenzenes, Synthesis (Chemistry)), Nitrites, Ions, Nitrogen compounds, Dioxides, Gases, Magnetrons, Molecules, Aromatic compounds

A method of chemical synthesis by gas phase ion-molecule reactions analogous to known liquid phase reactions is described. The synthesis of nitrobenzene by the reaction of NO 2 (+) and benzene is reported. The interaction of a beam of NO 2 (+) ions with maximum energies of 1 ev with gaseous benzene gave nitrobenzene in high yield. A 1-ma ion current consisting of 99% NO 2 (+) was formed by electron impact with nitrogen dioxide in a concentric dual-anode magnetron. (Author)

**AD-622 687 Div. 4/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*TEXAS UNIV AUSTIN DEPT OF PHYSICS*
**THE PHYSICS OF METASTABLE SYSTEMS.**
Final rept. for 1 Feb 62-31 Jan 63,
by W. W. Robertson. 31 Jan 63, 9p. Contract AF AFOSR62 270
AFOSR , 65-1046

Unclassified report

Descriptors: (*Helium, Glow discharges), (*Atoms, Stability), Molecules, Physical properties, Direct current, Electric discharges, Nuclear cross sections, Atmosphere, Molecular properties

A technical resume of the results of investigations is given in the following categories: cross sections for the de-excitation of helium metastable atoms by collisions with atoms; reactions of the metastable helium triplets; metastable helium atom concentration in the earth's atmosphere; calculation of cross sections for zero activation energy processes by simple collision models with emphasis on the Penning effect; and interaction of a triplet and a normal helium atom.

**AD-622 700 Div. 4/4 ,4/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*WASHINGTON UNIV SEATTLE DEPT OF CHEMISTRY*
**ELECTRON SPIN RESONANCE STUDIES OF THE ELECTRONIC STRUCTURE OF FREE RADICALS IN MOLECULAR CRYSTALS.**
Final rept. for 1 Oct 64-30 Sep 65,
by Gershon Vincow. 30 Sep 65, 6p. Contract DA ARO D31 124G254 Proj. AROD3453C

AROD , 3453:8

Unclassified report

Descriptors: (*Free radicals, Magnetic resonance), (*Microwave spectroscopy, Free radicals), Crystals, Impurities, Organic sulfur compounds, Dioxides, Ketones, Heterocyclic compounds, Atomic orbitals, Protons, Hyperfine structure, Aromatic compounds

Research in the following areas is briefly summarized: ESR of the thioxanthone S, S-dioxide mononegative ion (conjugation in sulfones); SCF calculations of spin-density distributions in heteroatom radicals; second moments of ESR proton hyperfine spectra; ESR of C6H6 (+) and related radicals molecular orbital degeneracy; ESR or cycloheptatrienyl.

**AD-622 738 Div. 4/4 ,25/4**
*CANTERBURY UNIV CHRISTCHURCH (NEW ZEALAND) DEPT OF CHEMISTRY*
**THE LIFETIME OF THE A.3ξU (+) STATE OF N2,**
by L. F. Phillips. 14 Sep 64, 6p. Contract AF AFOSR264 63 Proj. 9760 Task 976002
AFOSR , 65-1440 .

Unclassified report

Pub. in Canadian Journal of Chemistry v43 p369-74 1965 (Copies available only to DDC users).

Descriptors: (*Nitrogen, Atomic energy levels), (*Atomic energy levels, Relaxation time), Flames, Emissivity, Iodine, Reaction kinetics, Excitation, New Zealand

The decay of the blue emission from the active nitrogeniodine flame has been measured at iodine pressures down to 0.00014 torr. Extrapolation of the decay rate to zero iodine, pressure yields a value of 0.89=0.41/s for the first-order rate constant in absence of iodine, corresponding to a mean lifetime of 1.1s for the A.3ξu (+) state of N2. The rate constants for the reactions N + 12 (yields) N1 + I and N2 (3ξu (+))+I1 (yields) N2 (1ξG (+)) + 12* are (2.6 = 0.3) X 10 to the -14 power exp (-68 = 34/RT) and (8.3 = 1.2) X 10 to the -14 power cu cm/ molecule/s respectively. (Author)

**AD-622 751 Div. 4/4 ,10/7 ,4/2**
*RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF CHEMISTRY*
**THE REACTION OF CH RADICALS WITH AMMONIA,**
by David R. Safrany, Robert R. Reeves, and Paul Harteck. 27 May 64, 2p. Contract AF19 604 5979 Grant ,AF AFOSR174 63 Proj. 4984, ARPA 42

Unclassified report

Pub. in Journal of the American Chemical Society v86 p3160 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ammonia, Combustion), (*Free radicals, Chemical reactions), (*Combustion, Free radicals), Flames, Hydrocarbons, Nitrogen, Hydrogen, Hydrogen compounds, Cyanides

When ammonia was added upstream from an acetylenenitrogen flame, the ammonia was substantially consumed and hydrogen and hydrogen cyanide were produced (in addition to that expected if the nitrogen were supplied entirely in the form of molecular nitrogen). The following mechanism is proposed for the reaction and supporting evidence is provided: CH + NH3 (yields) HCN + H2 + H + 51 kcal.

**AD-622 754 Div. 4/4 ,4/2**
*RENSSELAER POLYTECHNIC INST TROY N Y*
**THE CHEMILUMINESCENT REACTION OF OXYGEN ATOMS WITH SULFUR MONOXIDE AT LOW PRESSURES,**
by Thomas R. Rolfes, Robert R. Reeves,Jr., and Paul Harteck. 8 Aug 64, 5p. Contract AF19 628 4069 Grant ,AF AFOSR174 63

Unclassified report

Pub. in Journal of Physical Chemistry v69 n3 p849-53 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oxygen, Luminescence), (*Sulfur compounds, Monoxides), (*Luminescence, Low-pressure research), Emissivity, Photochemistry, Dioxides, Quantitative analysis

The reaction of oxygen atoms with sulfur monoxide results in a visible blue emission, extending into the ultraviolet. The reaction was studied in the low pressure region up to a total pressure of 20 mu where the emission was found to be due to the simple two-body reaction, SO + O (yields) SO2 + photon, analogous to the two-body reaction of nitric oxide and oxygen atoms. The rate coefficient for this reaction was estimated as 7 X 10 to the -16th power cu cm./molecule sec. The SO was produced by reaction with O atoms via COS + O yields CO + SO. This reaction could also be used under certain conditions to titrate the oxygen atoms to obtain a quantitative measure of the oxygen atom concentration. (Author)

**AD-622 756 Div. 4/4 ,4/2**
*RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF CHEMISTRY*
**SURFACE-CATALYZED EXCITATIONS IN THE OXYGEN SYSTEM,**
by Gene Mannella, and Paul Harteck. 21 Nov 60, 5p.

Unclassified report

Pub. in The Journal of Chemical Physics v34 n6 p2177-80 Jun 1961 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oxygen, Excitation), (*Luminescence, Catalysis), Atomic energy levels, Catalysts, Nickel, Surfaces, Electron transitions, Band spectrum

A luminosity is produced over Ni maintained at approximately 20C in a stream of O atoms. Spectroscopic investigation shows the strongly forbidden b 1ξo (+) X 3ξo (-) atmospheric system and A 3ξu (+) - X 3ξo (-) Herzberg system of the O2 molecule plus four strong heads of the (0, 0) band of the OH A 2ξ (+) - X 2II interaction. Certain spectral features in the region of the (0, 0) atmospheric band could not be resolved for positive identification but are suggested to be the vibration-alrotational bands of OH. The Herzberg and atmospheric bands appear to be primary products of the surface catalysis while the OH molecule can be either a surface product or the result of chemical reactions of certain excited species present. (Author)

**AD-622 759 Div. 4/4 ,9/1 ,25/8**
*GENERAL ELECTRIC CO PHILADELPHIA PA MISSILE AND SPACE DIV*
**SHOCK-TUBE STUDY OF THE THERMAL DISSOCIATION OF NITROGEN,**
by Boyd Cary. 21 Jan 64, 13p. Contract AF49 638 1157 Proj. 9781 Task 978101 AFOSR , 65-1231

Unclassified report

Pub. in The Physics of Fluids v8 n1 p26-35 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nitrogen, Dissociation), (*Shock waves, Dissociation), Shock tubes, Interferometers, Argon, Neon, High-temperature research, Vibration, Relaxation time, Heat

The dissociation of nitrogen behind shock waves has been studied over a temperature range of 6000 to 10,000K. A time-resolved Mach-Zehnder interferometer measured the density profiles in the reaction zone. Rate expressions based on classical collision theory and the hydrodynamic constraint equations were used to fit the experimental profiles. Inferred rate constants are presented with N2, N, Ne, and Ar as third bodies. This work differs from previous studies of nitrogen in that a measurement of the forward dissociation rate was made in N2 with N2 as the third body and in that the new data indicates that N is about as effective a third body as N2. Vibrational relaxation data indicates that to a first approximation there is no significant coupling between vibrational relaxation and dissociation over the temperature range covered. Vibrational relaxation times in N2-Ne mixtures behind combustion driven shocks indicate that Ne is about 1.4 times as effective as N2 in vibrationally exciting N2, agreeing well with predictions of the Landau theory. This agreement between theory and experiment is just as good as that obtained for Ar utilizing pressure breaks, vindicating the combustion technique. (Author)

**AD-622 787 Div. 4/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AERO-ELECTRONIC TECHNOLOGY DEPT*
**STUDY OF SILVER CHLORIDE LUMINESCENCE.**
Final rept.,
by Donald Promish. 8 Oct 65, 24p. Rept. no. NADC-AE-6514
Task R360FR102 2021R011 01 01 ,EY6 07

Unclassified report

Descriptors: (*Silver compounds, Chlorides), (*Luminescence, Silver compounds), Infrared detectors, Quartz, Temperature, Spectra (Visible + ultraviolet), Fluorometers, Photomultipliers, Spectrophotometers

The study was prompted by the possibility of using Ag Cl as an infrared detector. The report presents data on the luminescence of a solid, polycrystalline sample of silver chloride. Monochromatic ultraviolet light was used to excite the sample, whose luminescence spectrum was examined at temperatures of 300 and 77K and wavelengths ranging from 200 to 800 millimicrons (mu). Several incident ultraviolet wavelengths, ranging from 200 to 300 mu, were used. Two luminescence peaks were observed. One of them diminished upon cooling the sample from 300 to 77K, and has been ascribed to the fused quartz wall of the sample holder. It is concluded that fused quartz might be a good infrared detector, and that silver chloride is not responsive to thermal effects at the wavelengths studied.

**AD-622 808 Div. 4/4 ,25/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*LEYDEN STATE UNIV (NETHERLANDS)*
**ON THE THEORY OF THE REFRACTIVE INDEX OF NON-POLAR GASES. II. STATISTICAL PART.**
Technical note,
by S. R. de Groot, and P. Mazur. 1965, 5p. Contract AF61 514 846

Unclassified report

See also PB-124 766.

Descriptors: (*Refractive index, Gases), (*Gases, Refractive index), (*Statistical mechanics, Refractive index), Thermodynamics, Irreversible processes, Helium

A statistical theory is given for the refractive index of non polar gases at low densities, taking into account both the effect of statistical fluctuations and the effect of the variation of the polarizability due to molecular interactions. A generalized Lorentz-Lorenz formula is derived and numerical calculations are performed for helium. For the highest frequencies considered the correction to the Lorentz-Lorenz function is about 15% larger than the corresponding correction to the ClausiusMosotti function. (Author)

**AD-622 824 Div. 4/4 ,25/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*QUEEN'S UNIV BELFAST (NORTHERN IRELAND) DEPT OF APPLIED MATHEMATICS*
**PROGRESS REPORT: CHEMICAL PHYSICS.**
Rept. for 1 Jul-30 Sep 65.
30 Sep 65, 6p. Contract N62558 4297

Unclassified report

Descriptors: (*Gas ionization, Probability), (*Scattering, Mathematical analysis), (*Electron bombardment, Potential theory), Molecular properties, Atomic energy levels, Potential scattering, Electron transitions, Molecular association, Field theory, Electron capture, Plasma medium, Great Britain

The progress of work involving the interactions of atoms, molecules, ions, and electrons is briefly summarized. A list is given of the 23 papers prepared during the reporting period.

**AD-622 850 Div. 4/4 ,4/3**
*RENSSELAER POLYTECHNIC INST TROY N Y*
**HCl-CATALYZED REACTION OF HYDROCARBONS WITH ACTIVE NITROGEN,**
by David R. Safrany, Paul Harteck, and Robert R. Reeves, Jr.. 26 Dec 63, 2p. Contract AF AFOSR 174 63 ,NSG 100 60

Unclassified report

Pub. in Journal of Chemical Physics v41 n4 p1161-2 Aug 15 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Nitrogen, Chemical reactions), (*Hydrocarbons, Chemical reactions), (*Hydrochloric acid, Catalysis), Free radicals, Reaction kinetics, Aliphatic compounds, Thermochemistry

The addition of HCl to mixtures of methane, ethane, and other saturated hydrocarbons, with active nitrogen yielded results which serve to emphasize the general importance of hydrocarbon radical reactions in the kinetics of hydrocarbon reactions with active nitrogen.

**AD-622 855 Div. 4/4**
*YALE UNIV NEW HAVEN CONN DEPT OF CHEMISTRY*
**THRESHOLD SHAPES AND RESONANCES IN THE PHOTODETACHMENT CROSS SECTIONS OF CHLORIDE, BROMIDE, AND IODIDE,**
by R. Stephen Berry, Carl W. David, and John C. Mackie. 10 Sep 64, 6p. Contract AF AFOSR 183 63 Proj. 9760 Task 976002 AFOSR , 65-1254

Unclassified report

Pub. in The Journal of Chemical Physics v42 n5 p1541-6 1 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Chlorides, Photochemistry), (*Bromides, Photochemistry), (*Iodides, Photochemistry), (*Electrons, Photochemistry), Alkali metal compounds, Halides, Vapors, Decomposition, Probability, Shock waves, Absorption spectrum, Resonance, Atomic orbitals

The photodetachment curves of Cl (-), Br (-), and I (-) were examined in their threshold regions by absorption spectroscopy of shock-heated alkali halide vapors. The chloride curve appears smooth and normal in terms of threshold laws, but the bromide and iodide curves show maxima about 500/cm above the thresholds, with widths of about 200/cm at half-height. The threshold positions are not affected by changes in conditions. The anomalously large absorption or resonances seem to be due to the halide ions, but to be influenced to some degree by the alkali atoms or ions. Three explanations, none entirely satisfactory, are put forth for the maxima; these are: (1) near-resonant transfer of energy from X + e (-) to M, giving X (-) + M*; (2) metastable autodetaching states of the halides; and (3) mxing of vacant alkali ion orbitals with continua of the halides. The third is considered most plausible. (Author)

**AD-622 880 Div. 4/4 ,4/2**
**CFSTI Prices: HC $4.00 MF $1.00**
*BRUSSELS UNIV (BELGIUM) LABORATOIRE DE CHIMIE PHYSIQUE*
**MASS SPECTROSCOPY STUDIES FOR HIGH TEMPERATURE CHEMISTRY. EVAPORATION OF ELEMENTS AND DISSOCIATION ENERGIES OF DIATOMIC MOLECULES. (ETUDES PAR SPECTROMETRIE DE MASSE EN CHINIE DES HAUTES TEMPERATURES. EVAPORATION D'ELEMENTS ET DE COMPOSES ENERGIES DE DISSOCIATION DE MOLECULES BIATOMIQUES),**
by Jean Drowart. May 57, 122p. Contract AF61 514 868

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale. Text in French.

Descriptors: (*Mass spectroscopy, Thermochemistry), (*Evaporation, Mass spectroscopy), (*Diatomic molecules, Dissociation), (*Dissociation, Energy), Ions, Vapor pressure, Sublimation, Entropy, Spectrum analyzers, Germanium, Aluminum, Gallium, Indium, Chromium, Manganese, Nickel, Copper, Silver, Gold, France

**AD-622 889 Div. 4/4**
*ROYAL INST OF TECH STOCKHOLM (SWEDEN) DEPT OF INORGANIC CHEMISTRY*
**STUDIES ON THE HYDROLYSIS OF METAL IONSXLIV. EXTRACTION STUDY OF THE HYDROLYSIS OF VANADIUM (V) AT VERY LOW CONCENTRATION IN ACID PERCHLORATE MEDIA,**
by D. Dyrssen, and T. Sekine. 10 Oct 63, 12p. Contract AF EOAR 63 8 AFOSR , 65-1275

Unclassified report

Pub. in Journal of Inorganic and Nuclear Chemistry v26 p981-91 1964 (Copies available only to DDC users).

Descriptors: (*Hydrolysis, Metals), (*Vanadium, Hydrolysis), Ions, Chemical equilibrium, pH, Sodium compounds, Perchlorates, acids, Phosphoric acids, Aliphatic compounds, Alcohols, Sweden

The distribution of carrier-free v48 between methyl isobutyl carbinol (hexol) and 0.5M (H,NaClO4) has been measured radiometrically at 25C as a function of -log (H (+)). Both curvefitting and LETAGROP adjustment with a high-speed computer were used to evaluate constants for the following equilibria: VO2 (+) + H2O = HVO3 + H (+), log K sub 1 = -3.20 = 0.09; HVO3 = VO (3-) + H (+), log K sub 2 = -3.78 = 0.09; HVO3 (aq) = HVO3 (hexol), log lambda = 1.99 = 0.09.

**AD-622 906 Div. 4/4 ,2/1 ,10/7 ,4/2**
*UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS*
**FRANCK-CONDON FACTORS TO HIGH VIBRATIONAL QUANTUM NUMBERS III: CN,**
by R. W. Nicholls. 1 Oct 63, 6p. Contract AF AFOSR62 236 Proj. 9768 Task 976801
AFOSR , 65-1087
Unclassified report

Pub. in Journal of Research of the National Bureau of Standards-A. Physics and Chemistry v68A n1 p75-8 Jan-Feb 1964 (Copies not available to DDC or Clearinghouse customers). See also AD-262 592.

Descriptors: (*Cyanogen, Electron transitions), Band spectrum, Intensity, Spectrum (Visible + ultraviolet), Flames, Comets, Stars

Franck-Condon factor arrays were computed numerically to high vibrational quantum numbers for the red (A2II2-X2ξ (+) and violet (B2ξ (+)-X2ξ (+) band systems of CN. (Author)

**AD-622 911 Div. 4/4**
*WASHINGTON UNIV ST LOUIS MO DEPT OF CHEMISTRY*
**TRIPLET STATE ESR OF METAL CHELATE COMPOUNDS,**
by S. I. Weissman, I. M. Brown, and L. C. Snyder. 7 Aug 64, 10p. Contract AF AFOSR62 365 Proj. 9767 Task 976701
AFOSR , 65-1341
Unclassified report

Pub. in Journal of Chemical Physics, v42 n3 p1105-11 Feb 1 1965. (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Argonne National Lab., Ill. and Bell Telephone Labs., Inc., Murray Hill, N. J.

Descriptors: (*Complex compounds, Microwave spectroscopy), (*Alkali metal compounds, Complex compounds), (*Microwave spectroscopy, Complex compounds), Pyridines, Polycyclic compounds, Nuclear magnetic resonance, Nuclear spins, Band spectrum, Hamiltonian, Dipole moments, Potassium compounds, N-heterocyclic compounds

The electron spin resonance spectra of a series of metal chelate compounds are reported. The metals are alkaline earths; the ligands are bidentate and tridentate derivatives of 2,2'-bipyridine and 1,10-phenanthroline and related compounds. The ESR spectra are interpreted as due to randomly oriented molecular triplets. Most spectra can be computer-simulated with a spin-Hamiltonian corresponding to a magnetic dipole-dipole interaction of the unpaired electrons of D = 0.01/cm and E =O. The vanishing value of E is interpreted to mean that the complexes have S4 symmetry with the ligands on opposite sides of the cation and having mutually perpendicular planes. The simulation of some spectra requires a distribution of D and E values which we attribute to interaction with the glassy environment. The spectra of some potassium chelate dimers are also reported. These characteristically appear to have nonvanishing E values. (Author)

**AD-622 923 Div. 4/4 ,10/7 ,10/5**
*RENSSELAER POLYTECHNIC INST TROY N Y*
**OXIDATION OF DIETHYLDIBORANE,**
by Walter H. Bauer, Stephen E. Wiberley, and Erik I. Sandvik. 1964, 18p. Contract AF49 638 897
AFOSR , 65-1432
Unclassified report

Pub. in Progress in Astronautics and Aeronautics v15 p375 1964 (Copies not available to DDC or Clearinghouse customers). Prepared for presentation at AIAA Heterogeneous Combustion Conference, Palm Beach, Fla. 11-13 Dec 1963. Prepared in cooperation with Jersey Production Research Co., Tulsa, Okla.

Descriptors: (*Organoboranes, Oxidation), (*Explosions, Organoboranes), Reaction kinetics, Thermochemistry, Combustion, Ignition, Fire safety, Liquid rocket propellants, Diboranes

The gas-phase oxidation of sym-diethyldiborane was studied under both explosive and nonexplosive conditions. With excess oxygen the nonexplosive reaction was a partial oxidation to form ethyl metaborate and hydrogen. The rate of disappearance of sym-diethyldiborane in the partial oxidation was found to be zero order in oxygen and first order in symdiethyldiborane. The formation of an unstable intermediate in the partial oxidation was observed. The products of explosions with excess oxygen were carbon dioxide, water, and a white solid, B2O3. The explosion is believed to be predominantly thermal in nature. The enthalpy change of the partial oxidation was estimated to be sufficient to initiate complete combustion by the temperature increase caused by energy release on formation of ethyl metaborate and hydrogen. (Author)

**AD-622 962 Div. 4/4 ,4/3 ,4/2**
*SOUTH CAROLINA UNIV COLUMBIA DEPT OF CHEMISTRY*
**ION-SOLVENT INTERACTION. THE INTERACTION OF A PHOSPHINE OXIDE AND A QUATERNARY AMMONIUM ION,**
by W. R. Gilkerson, and J. B. Ezell. 29 Apr 65, 4p.
AROD , 2913:7
Unclassified report

Pub. in the Journal of the American Chemical Society v87 n17 p3812-5 5 Sep 1965 (Copies not available to DDC or Clearinghouse customers). Supported in part by a grant from the U. S. Army Research Office (Durham).

Descriptors: (*Phosphine oxides, Solvents), (*Ammonium compounds, Electrical conductance), Ions, Organic phosphorus compounds, Perchlorates, Iodides, Aromatic compounds, Complex compounds, Dissociation, Dielectric properties

The effect of added triphenylphosphine oxide on the conductances of methyltri-n-butylammonium perchlorate and iodide in o-dichlorobenzene and of the perchlorate in ethylene chloride was investigated at 25C. The results are interpreted in terms of cation-phosphine oxide complex formation. The addition of the phosphine oxide to the cation lowers the limiting equivalent conductance of the salts 1517%. Viewing the addition of phosphine oxide to the cation as involving a displacement of a solvating solvent molecule from the cation, the association constants for the complex in the two solvents are used as measures of specific cation-solvent interaction to account for the differences observed for ion-pair dissociation constants in the two almost isodielectric solvents. (Author)

**AD-622 966 Div. 4/4 ,25/4**
*RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF CHEMISTRY*
**FORMATION AND REACTIONS OF THE EXCITED O2 (A3ξU (+)) MOLECULES,**
by P. Harteck, and R. R. Reeves,Jr.. 20 Jan 64, 8p. Contract AF AFOSR174 63
Unclassified report

Pub. in Discussions of the Faraday Society n37 p82-6 1964 (Copies available only to DDC users.)

Descriptors: (*Night sky, Band spectrum), (*Oxygen, Band spectrum), (*Band spectrum, Oxygen), Recombination reaction, Catalysis, Nickel, Ozone, Atomic energy levels, Excitation, Hydrogen, Nitrogen compounds, Monoxides

The emission of the Herzberg bands can be readily observed in the laboratory by catalyzing the recombination of oxygen atoms on nickel. In a clean system the ozone concentration may increase due to the reaction with oxygen (O2A3ξu (+) + O2 yields O3+O). Addition of a few 0/0 hydrogen results in a strong OH emission (2ξ (+) yields 2II) apparently due to the reaction O3A3ξu (+) + H2 yields OH + OH2ξ (+). Addition of NO give a characteristic reddish hue to the emission. The surface catalysis also was apparent in several glass systems. (Author)

**AD-623 033 Div. 4/4 ,30/3 ,25/4**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**CHARACTERIZATION OF THE VOLTAGE FLUCTUATION IN THE DIRECT CURRENT ARC FOR SPECTROCHEMICAL ANALYSIS,**
by James W. Mellichamp. 21 Apr 65, 6p.
Unclassified report

Pub. in Analytical Chemistry v37 n10 p1211-6 Sep 1965 (Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Spectrophotometers, Electric arcs), (*Electric arcs, Voltage), Direct current, Electrodes, Voltage dividers, Recording systems, Materials

Recordings of the voltage fluctuation in the d.c. arc give direct evidence of events that are taking place and can be used for the development of analytical procedures. Recordings show sample consumption time, arc stability, reproducibility, and irregularities that are not readily discernible from spectrograms alone. A study was made of the voltage fluctuation for different materials, including 67 elements in the elemental state, to correlate the recorded voltage patterns with the properties of the material. The patterns are found to be a function of both the analytical conditions under which they are made--e.g., arc current, electrode design, arc gap, etc.--and the properties of the sample material such as boiling point, density, ionization potential, and reactivity with the electrode material or the surrounding atmosphere. Under standardized analytical conditions, voltage fluctuation patterns are different for each material and are characteristic of that material. (Author)

**AD-622 391 See Fld. 20/3**

**AD-622 398 See Fld. 20/6**

**AD-622 499 See Fld. 7/3**

**AD-622 503 See Fld. 7/3**

**AD-622 524 See Fld. 21/8**

**AD-622 532 See Fld. 7/2**

**AD-622 577 See Fld. 7/3**

**AD-622 582 See Fld. 21/8**

**AD-622 594 See Fld. 7/3**

**AD-622 689 See Fld. 8/10**

AD-622 690 See Fld. 21/2

AD-622 691 See Fld. 20/13

AD-622 704 See Fld. 14/2

AD-622 726 See Fld. 18/4

AD-622 743 See Fld. 21/2

AD-622 752 See Fld. 7/3

AD-622 818 See Fld. 10/3

AD-622 820 See Fld. 20/12

AD-622 847 See Fld. 7/3

AD-622 854 See Fld. 7/2

AD-622 874 See Fld. 11/7

AD-622 897 See Fld. 21/2

AD-622 943 See Fld. 14/2

AD-623 026 See Fld. 9/1

AD-623 045 See Fld. 20/12

## 8/2. CARTOGRAPHY

**AD-622 335 Div. 2/4 ,12/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*AERONAUTICAL CHART AND INFORMATION CENTER ST LOUIS MO*
**DETERMINATION OF GROUND POSITIONS FROM OBSERVATIONS OF ARTIFICIAL EARTH SATELLITES.**
Technical rept.,
by Bela Szabo. Oct 59, 76p. Rept. no. ACIC R-86

Unclassified report

Descriptors: (*Astronomical geodesics, Satellites (Artificial)), (*Satellites (Artificial), Astronomical geodesics), (*Position finding, Astronomical geodesics), Orbital trajectories, Celestial mechanics, Optical tracking, Photographic techniques, Geodesics

The presentation is organized in three phases. The first phase presents the formulae and procedure for computing the coordinates of the satellite from published orbital data. The second phase describes the adaptation of classical methods of astronomical photography for the purpose of obtaining the coordinates of the satellite from a photographic plate. It is not the intention of this report to describe the method of photographing the satellite or recording the time of observation. Phase two begins with the procedure for identifying the reference stars after the photographic plate has been processed. It must be assumed that the operator is trained in the use of the measuring instrument. The reduction is prepared for readings from a linear comparator type of plate measuring device; not for readings of angular measure. The third phase combines the results of the first and second phases in order to produce the x,y,z space coordinates of the observation site. These can be converted to geocentric latitude and longitude. Then these geocentric coordinates can be converted into geodetic latitude and longitude by the standard formulae which has been included in the Appendix. These three phases of the report contain all the necessary working formulae, the outlined procedure, and sample computations. The derivation of formulae and additional information which is not essential to the computation procedure is relegated to the appendixes.

**AD-622 465 Div. 2/2 ,2/4 ,24/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**GEODESY AND CARTOGRAPHY, NO. 10, 1964 (SELECTED ARTICLES).**
8 Oct 65, 20p. Rept. no. FTD-TT-65-1224 TT , 65-64190

Unclassified report

Unedited rough draft trans. of Geodeziya i Kartografiya (USSR) n10 p15-7, 37-42 1964. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Geodesics, Instrumentation), (*Mapping, Instrumentation), (*Exposure meters, Aerial photography), (*Aerial photography, Exposure meters), Photographic lighting systems, USSR

Contents: Production testing of the ST-62 light telemeter; Electronic device for automatic exposure determination for printing aerial photographs.

**AD-622 479 Div. 2/4 ,12/6 ,12/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**NOTE ON DETERMINING THE OVERALL DISTANCE SCALE OF THE EARTH USING HIGH ALTITUDE SATELLITES,**
by W. H. Guier. 23 Jul 64, 24p. Rept. no. CF-3098
Contract NOw62 0604c

Unclassified report

Descriptors: (*Orbital trajectories, Measurement), (*Space stations, Tracking), (*Astronomical geodesics, Satellites (Artifical)), Errors, Simulation, High altitude, Gravity, Doppler radar, Satellites (Artificial), Earth

The note presents the results of a recently completed simulation which indicates that satellite orbits with markedly different altitudes are required to determine accurately both the zeroth order zonal harmonic (the term in the geopotential representing the total force constant of the earth) and the distance scale to be applied to tracking station radii. While the simulation presents only the results for doppler data, the analysis shows that analogous results are to be expected for range data when comparable in accuracy to the doppler data. The results indicate that data which contains biases equivalent to about 5 meters position error cannot determine independently the total mass constant and distance scale factor to better than about 2/100,000 if only satellites of about 1000 km altitude are used. However, it is shown that if one satellite of at least 3000 km altitude is included, the error should be decreased to about 5/1,000,000. Radar range data with a bias error of less than 3 meters should allow the error to be reduced to below 1/100,000 for satellites of 1000 km altitude. (Author)

**AD-622 816 Div. 2/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*AERONAUTICAL CHART AND INFORMATION CENTER ST LOUIS MO*
**DETERMINATION OF THE EARTH'S RADIUS USING PROJECTION METHOD FORMULAS,**
by Vojislav Dimitrijevich. Apr 64, 12p.

Unclassified report

Presented at the Annual Meeting, American Geophysical Union (45th), Washington, D. C. 21-24 Apr 64.

Descriptors: (*Geodesics, Projective geometry), (*Projective geometry, Geodesics), Ellipsoids, Numerical analysis, Astronomical geodesics

The paper presents a summary of methods commonly used to determine the earth's size and shape and a brief review of the projection method. To illustrate the projection method, a numerical example is given using 12 astrogeodetic stations on the North American Datum 1927, Clarke 1866 Ellipsoid. In the example, the flattening for the new ellipsoid is assumed fixed at 1/298.3 as previously determined by Helmert and Krasovskiy. The value of da is determined as - 35.1 m and, by computation from Milan Bursa's formulas for determination of 'a' for Europe, the value of da is - 35.3 m. Although the number of stations which are used in the example is too small, it is adequate to demonstrate the projection method for obtaining the equatorial radius. (Author)

AD-622 478 See Fld. 22

AD-622 485 See Fld. 9/2

AD-622 545 See Fld. 4/2

AD-622 571 See Fld. 14/5

AD-622 715 See Fld. 20/3

## 8/6. GEOGRAPHY

**AD-622 429 Div. 2/5 ,13/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H*
**GEOMETRIC INTERPRETATION OF THE THREEDIMENSIONAL YIELD CRITERION OF SOILS.**
Research rept.,
by Shunsuke Takagi. Jul 65, 14p. Rept. no. RR-164
Task DA 1V014501B52A31

Unclassified report

Descriptors: (*Soil mechanics, Plasticity), (*Plasticity, Soil mechanics), Soils, Deformation, Stresses, Tensor analysis

A geometric interpretation of the invariants of a threedimensional tensor is developed. With this interpretation, the yield criterion for three-dimensional plastic deformation is given geometric expression similar to the Coulomb criterion of yielding for plane plastic deformation. It is discovered that the procedure conventionally used in triaxial tests to determine the yield criterion is not theoretically valid. An alternative method based on the geometric interpretation developed herein is suggested. (Author)

**AD-622 510 Div. 2/5**
**CFSTI Prices: HC $4.00 MF $0.75**
*COORDINATING COMMITTEE ON GREAT LAKES BASIC HYDRAULIC AND HYDROLOGIC DATA*
**LAKE ONTARIO OUTFLOWS, 1860-1954.**
Dec 58, 105p.

Unclassified report

Descriptors: (*Great Lakes, Drainage), (*Hydrology, Great Lakes), Inland waterways, Rivers, Fluid flow, Volume, Records, Civil engineering, Canada, United States

The purpose of this report is to document the Lake Ontario outflow studies and to record the outflows which were derived for the period 1860-1954 for the information of the responsible Federal agencies in Canada and the United States. The Coordi-

nating Committee terminated its Lake Ontario outflow studies with the year 1954 with the knowledge that the responsible Federal agencies of the United States and Canada would continue the derivation and coordination of the outflows subsequent to that year.

**AD-622 511 Div. 2/5 ,30/3**
**CFSTI Prices: HC $5.00 MF $1.00**
*COORDINATING COMMITTEE ON GREAT LAKES BASIC HYDRAULIC AND HYDROLOGIC DATA*
**HISTORY OF WATER LEVEL GAGES. LAKE ONTARIO AND THE INTERNATIONAL SECTION OF THE ST. LAWRENCE RIVER.**
Jan 62, 171p.
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Depth indicators, History), Water, Canada, United States, Great Lakes

The histories of all gaging stations of value to the governments of Canada and the United States that have provided water level data for various periods of time up through December 1961 are presented. For each station the following data are given: Comprehensive statement as to how datums were established; a chronological table listing the period when water level observations were made, the controlling bench mark and its elevations, the type of record, and the operating agency; the International Great Lakes Datum (1955) elevation of a controlling bench mark or the relationship between that datum and the previous datum established at the gaging station; and description and location of the gaging station sites for which adequate information is available.

**AD-622 718 Div. 2/5**
*WISCONSIN UNIV MADISON*
**THE LAND BENEATH THE ICE,**
by Charles R. Bentley. 1965, 20p.
Unclassified report

Pub. in Antarctica p259-77 1965 (Copies available only to DDC users).

Descriptors: (*Ice, Polar regions), (*Geology, Polar regions), (*Glaciers, Polar regions), Ice islands, Thickness, Measurement, Seismology

Seismic soundings of the interior ice cap of the Antarctic Continent.

**AD-622 721 Div. 2/5**
*WISCONSIN UNIV MADISON GEOPHYSICAL AND POLAR RESEARCH CENTER*
**THE BOTTOM TOPOGRAPHY OF GULKANA GLACIER, ALASKA RANGE, ALASKA,**
by N. A. Ostenso, P. V. Sellmann, and T. L. Pewe. 18 Nov 64, 10p.
Unclassified report

Pub. in Journal of Glaciology, v5 n41 p651-60 Jun 1965. (Copies available only to DDC users). Prepared in cooperation with Army Cold Regions Research and Engineering Lab., Hanover, N. H. and Alaska Univ., College. Dept. of Geology.

Descriptors: (*Glacier, Alaska), Ice, Configuration, Motion, Geological survey

As an extension of an intensive study of Gulkana Glacier a 42 station gravimeter survey was made to gain some insight into its third dimension. This survey showed that the glacier's main tongue occupies a complex valley composed essentially of two parallel channels separated by a medial ridge which extends southward from rock bastions in the accumulation zone. At midglacier the ice thickness in the larger eastern channel is 225 m., in contrast to 130 m. in the western channel. The medial ridge degenerates down-glacier probably disappearing within 2 km. of the glacier terminus. The basic surface flow pattern of the glacier described by Moores can be adequately explained by this basal topography. Seasonal velocity variations are possibly caused by melt-water basal lubrication with one channel being favored over the other at different times of the year, in agreement with observations by Elliston on the Gorner-Gletscher, Switzerland, and with the glacier sliding theory of Weertman. (Author)

**AD-622 773 Div. 2/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H*
**STRENGTH STUDIES ON ANTARCTIC SEA ICE,**
by George Hendrickson. Jul 65, 26p. Rept. no. TR-157
Proj. DA1VO14501B52A
Unclassified report

Descriptors: (*Ice islands, Strength), Polar regions, Sea water, Ice, Physical properties

The strength of sea ice was studied at McMurdo, Antarctica, during two successive field seasons. Three hundred tensile tests were made on continuous core samples taken at various locations on ice aged 1 year, 2 years, and more than 5 years. Salinity profiles were obtained for each core. A relationship between strength sigma (kg/sq cm) and volume of brine cavities v (%0), as suggested by Assur, adequately represents the data for brine volumes less than 0.400: sigma = 29.1 - 48.0 v to the 1/2 power. The constants agree satisfactorily with values obtained previously for Arctic sea ice, the value of sigma for very low brine volume approaching the value for fresh-water ice. The model on which the above expression is based apparently breaks down at high brine volumes. (Author)

**AD-622 775 Div. 2/5 ,25/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H*
**OPTICAL MEASUREMENTS ON SNOW,**
by Malcolm Mellor. Jun 65, 26p. Rept. no. RR-169
Proj. DA1V025001A130
Unclassified report

Descriptors: (*Snow, Optical properties), Light, Absorption, Scattering, Reflection, Density, Crystal structure, Optics

Spectral extinction measurements for the visual range were made on homogeneous snow samples prepared under controlled conditions, with snow density and grain size as variables. Comparative measurements were made on coarse-grained natural snow. Extinction coefficient nu was in the range 0.8 to 1.7/cm for fine-grained dense snow, and 0.16 to 0.37/cm for the coarse-grained snow. In the fine-grained snow, where scattering is thought to be the dominant attenuating process, there is a general decline in nu as wavelength lambda increases from 0.4 to 0.7 microns. In the coarse-grained snow, where absorption becomes significant, spectral selection was slight, with a weak minimum in the region 0.5 to 0.6 microns. When nu is related to density it must have a maximum value; limited data for fine-grained snow show this maximum in the density range 0.45 to 0.60 g/cc, and the density for maximum extinction is inversely related to wavelength. For a given density nu decreases as grain size increases, the rate of change varying with wavelength. Spectral reflectance measurements on natural snow are reported, and attenuation data are interpreted to give surface reflectivity for fine-grained snow. Diffuse reflection from fine-grained snow is believed to have little spectral dependence in the visual range, but with coarse-grained snow reflectance is expected to become inversely dependent on wavelength. It is suggested that optical principles might be applied in the measurement of snow structure, and also for remote sensing of snow-covered terrain. (Author)

**AD-622 833 Div. 2/5 ,30/2 ,15/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*NORTHWESTERN UNIV EVANSTON ILL DEPT OF GEOGRAPHY*
**ENVIRONMENTAL SCIENCES COMPUTER STUDY.**
Final rept.,
by W. L. Garrison, and W. C. Krumbein. Aug 65, 8p. Contract Nonr122826 Proj. ONR389 135
Unclassified report

See also AD-420 468.

Descriptors: (*Geophysics, Data processing systems), (*Data processing systems, Geophysics), Geology, Structural geology, Geography, Programming (Computers), Statistical analysis, Computers

The main goals of the research were, generally: (1) to examine developments in computer hardware and software technology, and to compare these with needs in the earth sciences. (2) Conduct certain research and experimental studies toward developing computer 'capability,' in those fields. Titles of the 15 technical reports from the study are listed.

**AD-622 964 Div. 2/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF GEOLOGY*
**GEOLOGIC STUDIES OF THE COLORADO DELTA.**
Annual summary rept. for Jan-Aug 65,
by Donn S. Gorsline. Aug 65, 42p. Rept. no. USC-GEOL-65-3
Contract Nonr22829 Proj. NR388 079
Unclassified report

Descriptors: (*Deltas, Mexico), Rivers, Colorado, Drainage, Geological survey, Hydrology

Reconnaissance field work in the Colorado Delta area has been begun. Work includes detailed mapping of micro relief features of sand tide flats, tidal channel and marsh. Sediment samples have been collected from tide flat, beach, spit and tide creek environments. Aerial photographic studies are in progress. (Author)

**AD-622 622 See Fld. 8/7**

**AD-622 941 See Fld. 8/7**

**AD-623 043 See Fld. 12/1**

## 8/7. GEOLOGY AND MINERALOGY

**AD-622 328 Div. 2/8 ,25/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB HANOVER N H*
**AN X-RAY STUDY OF THE ETHYLENE GLYCOLMONTMORILLONITE COMPLEX.**
Research rept.,
by Robert C. Reynolds,Jr.. Jul 65, 15p. Rept. no. RR-171
Task DA 1V014501B52A31
Unclassified report

Descriptors: (*Soils, X-ray spectrum), (*Montmorillonite, X-ray spectrum), (*Glycols, X-ray spectrum), (*X-ray spectroscopy, Clay minerals), Complex compounds, Fourier analysis, Crystal structure, Thermal properties, Models (Simulations)

Oriented aggregates of ethylene glycol-montmorillonite were studied by X-ray spectrometric methods. Basal reflections, through the 00 14, provided

the basis for structural analysis by Fourier and trial and error methods. On the basis of the intensity data, it is concluded that glycol molecules form a staggered, two-layered complex; water molecules and exchangeable cations lie close to but not coincident with a plane that separates the two glycol layers. The glycol molecules in each layer are disposed in c-axis face-centered array. The are oriented so that the plane of symmetry of the aliphatic chain parallels the c-axis. This proposed structure is a twolayer modification of a previously described glycolvermiculite structure. (Author)

**AD-622 331 Div. 2/8**
**CFSTI Prices: HC $6.00 MF $1.50**
*MASSACHUSETTS INST OF TECH CAMBRIDGE SOIL MECHANICS DIV*
**THE INFLUENCE OF STRESS SYSTEM ON THE BEHAVIOR OF SATURATED CLAYS DURING UNDRAINED SHEAR.**
Phase rept. no. 1, pt. 2, on Research in Earth Physics,
by Charles C. Ladd, and Julius Varallyay. Jul 65, 264p. Rept. no. RR-R65-11
Contract DA22 079eng330 Proj. 1V0 14501B52A30,ARPA Order 400
Unclassified report

Descriptors: (*Clay, Shear stresses), (*Soil mechanics, Clay), Drainage, Stresses, Rotation, Strain (Mechanics), Tensile properties, Tables, Compressive properties

The study investigates one phase of the overall problem of determining in situ properties, namely, the effects of stress system variables on the undrained shear behavior of saturated clays. Stress system variables refer to the direction and relative magnitude of the three principal stresses during consolidation and during shear. The report reviews and analyzes previous work in the area and presents the results of an extensive series of consolidated-undrained triaxial tests with pore pressure measurements on normally consolidated Boston blue clay prepared from a dilute slurry. The effects on undrained shear behavior of the following topics are considered in detail: anisotropic consolidation, perfect sampling, the intermediate principal stress, and rotation of principal planes during shear. These variables are shown to have a significant influence on most of the strength parameters.

**AD-622 436 Div. 2/8 ,30/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*CAMBRIDGE SYSTEMS INC NEWTON MASS*
**DESIGN MODIFICATION AND LABORATORY TESTING OF THE ML-592 ()/ TMQ-11 ELECTRONIC DEW POINT SENSOR.**
Final rept. for Nov 64-Jun 65,
by Frederick Gralenski. Jun 65, 46p. Contract AF19 628 4216 Proj. 433L
AFCRL , 65-514
Unclassified report

Descriptors: (*Dew point, Measurement), (*Meteorological instruments, Dew point), Electronic equipment, Theory, Hygrometers, Test methods, Thermoelectricity, Wiring diagrams

This report presents a detailed theoretical analysis and correlated experimental work directed toward identification of the transfer function requirements for components utilized in feedback loops for automatic thermoelectric dew point hygrometer systems. The analyses are applied to the electronic dew point sensor, ML-592 ()/TMQ-11, as manufactured by Cambridge Systems, Inc. Detailed transfer function requirements are presented for all system components. The results of extensive laboratory tests over the entire dew point temperature spectrum are given. (Author)

**AD-622 622 Div. 2/8 ,2/5**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS SPACE PHYSICS LAB*
**PREFERRED ORIENTATION OF CHONDRULES IN CHONDRITES.**
Environmental research papers,
by Robert T. Dodd Jr.. 7 Mar 65, 20p. Rept. no. ERP-138
Proj. 8602 Task 860203
AFCRL , 65-676
Unclassified report

Pub. in Icarus v4 n3 p308-16 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Petrology, Meteorites), (*Meteorites, Petrology), (*Crystallography, Meteorites), Extraterrestrial topography, Petrography, Minerals, Geochemistry

Twenty H- and L-group chondrites, showing various degrees of recrystallization, were examined for preferred chondrule orientation. All of the samples but three possess a foliation, which is poorly developed in two chondrites and pronounced in the others. Most of the strongly foliate samples also possess a lineation in the plane of foliation. As the foliation in these chondrites shows no systematic change in intensity with the degree of recrystallization, it is interpreted as a relict sedimentary fabric which was imposed during deposition of the chondrules. The same can be said, with less conviction, of lineation. (Author)

**AD-622 941 Div. 2/8 ,2/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**METEORITES. COMILATION OF ABSTRACTS FROM THE SOVIET JOURNAL METEORITIKA,**
by D. Michaels, and N. Cantacuzene. 16 Apr 64, 8p. Rept. no. AID-U-64-23
TT , 65-64295
Unclassified report

Selected abstract trans. from Meteoritika (USSR) n23 1963.

Descriptors: (*Meteorites, Petrology), (*Petrology, Meteorites), Extraterrestrial topography, Minerals, Chemical analysis, Abstracting, USSR

**AD-622 573** **See Fld. 8/11**

**AD-622 774** **See Fld. 5/1**

**AD-623 063** **See Fld. 3/1**

## 8/9. MINING ENGINEERING

**AD-622 934 Div. 17/1 ,26/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**BRIEF HISTORY OF RUSSIAN FERROUS METALLURGY: COMPREHENSIVE REPORT.**
AID Work Assignment no. 64.
29 Apr 64, 40p. Rept. no. AID-U-64-32
TT , 65-64279
Unclassified report

Based on Soviet and pre-Revolutionary sources.

Descriptors: (*Metallurgy, USSR), History, Refining (Metallurgy), Iron, Steel, Rolling (Metallurgy)

## 8/10. PHYSICAL OCEANOGRAPHY

**AD-622 306 Div. 2/9**
*WASHINGTON UNIV SEATTLE DEPT OF ATMOSPHERIC SCIENCES*
**THE WIND-DRIVEN CIRCULATION OF ICE AND WATER IN A POLAR OCEAN.**
Revised ed.,
by William J. Campbell. 16 Apr 65, 24p. Rept. no. TR-17
Contract Nonr47724 Proj. NR307 252
Unclassified report

Pub. in Journal of Geophysical Research v70 n14 p32793301 Jul 15 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 11 Jan 65.

Descriptors: (*Ice islands, Drift), (*Ocean currents, Arctic Ocean), Marine geophysics, Wind, Coriolis effect, Fluid mechanics, Oceanology

A steady-state theory for the circulation of a wind-driven, baroclinic, ice-covered ocean is presented. The ice is considered to flow under the action of five forces: the air stress, the water stress, the stress transmitted through the ice pack, the Coriolis force, and the pressure gradient force due to the tilting of the sea surface. Prandtl-type boundary layers are assumed at both ice surfaces. The ice is treated as a film of highly viscous fluid, composed of ice floes which act as fluid elements having rigid upper and lower surfaces characterized by roughness parameters. The theory is applied to the Arctic Ocean, where the beta-plane approximation cannot be made, so the actual variation of the Coriolis parameter with latitude is considered. A nonanalytical stress field deduced from the field of mean sea-level pressure is used for the numerical integration of the equations. The solutions for the ice circulation show an anticyclonic cell centered in the Beaufort Sea with a broad stream running from the Asian coast across the pole to Greenland. All solutions show an anticyclonic gyral in the surface waters on the Pacific side of the ocean, and it is theorized that an ice eddy viscosity as high as 3.0 x 10 to the 12th power/sec is necessary in order for the gyral to occupy its observed position. (Author)

**AD-622 379 Div. 2/9**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL OCEANOGRAPHIC OFFICE WASHINGTON D C*
**REGULARITIES IN THE DISTRIBUTION OF BOTTOM SEDIMENTS ON THE SHELF OF THE SOVIET COAST OF THE BLACK SEA (ZAKONOMERNOSTI RASPREDELENIYA DONNYKH OSADKOV NA SHELFE SOVETSKIKH BEREGOV CHERNOGO MORYA),**
by M. G. Barkovskaya. 1965, 42p. Rept. no. trans-250
TT , 65-64168
Unclassified report

Trans. of Akademiya Nauk SSSR. Institut Okeanologii. Trudy, v53 p123-48 1961.

Descriptors: (*Black Sea, Marine geology), (*Marine geology, Black Sea), (*Sedimentation, Black Sea), Ocean bottom topography, Marine biology, Petrology, Ecology

The investigations conducted during the years 1946-1950 are discussed. The zoning and distribution of the bottom sediments is based on the following: The geological structure of the land mass adjacent to the Black Sea, the petrographic composition of the denudation areas, the land relief, the coastal configuration, the steepness of the shelf etc. Over 100 cross sections ranging from 2 to 50 miles long, normal to the coast, were employed. Sectors with clearly pronounced variations in sedimentation were selected, such as, platform and geosyncline regions, mountain areas, plains, gulfs, estuaries, capes, etc. The bottom samples were taken by the Petersen grab and corers (2.5 meters long). On the basis of approximately 3000 samples taken on the Black Sea Shelf, the following zones were established: indigenous rock, pebble, boulder, block, gravel, sand, mussel, aleurite mud, aleurite-pelite mud and pelite mud zones. The width, character, distribution and other aspects of these zones are noted and compared with earlier studies by Zenkovich, Klenova and others. The biocoenosis in the sediments is based on previous studies

by Zernov (1913) Arkhangel'skiy and Strakhov (1938). Special investigations were conducted in order to link the various biocoenosis, such as mussel Mytilus and phaseolin mud biocoenosis, with the listed sediment zones on the shelf and to point out the regularities governing the association between the types of biocoenosis and sediments. (Author)

**AD-622 434 Div. 2/9**
**CFSTI Prices: HC $2.00 MF $0.50**
*LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y*
**OCEANOGRAPHIC RESEARCH.**
Progress rept. no. 8, 1 Jan-31 Dec 64, 31 Dec 64, 28p. Contract Nonr26648
Unclassified report

See also AD-600 407.

Descriptors: (*Oceanology, Scientific research), Oceanographic equipment, Marine geophysics, Marine geology, Physical chemistry

Included in this program are studies in marine geology, the sediments, their character, distribution and origin, the structure of the ocean basins and the tectonic features found within them; and the physiography of the ocean floor; in marine geophysics, including seismology reflection as well as refraction - gravity, magnetism, and geothermal measurements; and in oceanography, both physical and chemical.

**AD-622 506 Div. 2/9 ,5/2 ,2/7**
**CFSTI Prices: HC $2.00 MF $0.75**
*GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF*
**SOME OBSERVATIONS FROM A PROTOTYPE OCEAN DATA STATION BUOY IN HURRICANE BETSY, 6-8 SEPTEMBER 1965,**
by Robert F. Devereux, Harold Q. Driscoll, Ralph F. Kosic, and Stanley T. Uyeda. 1 Oct 65, 44p. Rept. no. GDC-65-203
Contract Nonr306200 Proj. NR083 147
Unclassified report

Descriptors: (*Oceanographic equipment, Buoys), (*Buoys, Oceanographic equipment), (*Weather station, Buoys), (*Telemeter systems, Oceanographic equipment), Environmental tests, Fluid dynamic properties, Tropical cyclones, Oceanographic data, Meteorological parameters, Data transmission system

Engineering evaluation tests are conducted for a generalpurpose buoy developed for long-range telemetering of oceanographic and meteorological data to processing stations ashore.

**AD-622 598 Div. 2/9**
*OREGON STATE UNIV CORVALLIS DEPT OF OCEANOGRAPHY*
**CALCIUM CARBONATE SATURATION IN THE OCEAN,**
by R. M. Pytkowicz. 1965, 7p. Contract NSF GP2566
Unclassified report

Pub. in Limnology and Oceanography v10 n2 p220-25 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Sea water, Calcium compounds), (*Calcium compounds, Oceans), (*Oceans, Calcium compounds), Carbonates, Distribution, Pacific Ocean, Chemical analysis, Oceanology

A procedure and a nomogram are presented for the determination of the calcium carbonate saturation of seawater at in situ pressures. This procedure was applied to data from the eastern South Pacific Ocean, and results show that these waters are generally undersaturated below the first few hundred meters. This undersaturation suggests that sinking calcareous tests will partly dissolve and that the specific alkalinity should increase with time. (Author)

**AD-622 599 Div. 2/9**
*OREGON STATE UNIV CORVALLIS DEPT OF OCEANOGRAPHY*
**RATES OF INORGANIC CALCIUM CARBONATE NUCLEATION,**
by Ricardo M. Pytkowicz. 24 Feb 64, 4p. Contract Nonr128610 Proj. NR083 102
Unclassified report

Pub. in Journal of Geology v73 n1 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Calcium compounds, Sea water), (*Sea water, Calcium compounds), (*Oceans, Calcium compounds), Carbonates, Nucleation, Chemical precipitation, Oceanology

The induction period for the inorganic precipitation of calcium carbonate was examined over a wide range of supersaturations. Results suggest that inorganic precipitation in average sea water would require about 100,000 years. If most of the bicarbonate were converted to carbonate, precipitation could occur in 500 hours. The power dependence of the rate of nucleation on the carbonate concentration is second order in the absence of magnesium and sixth order in its presence; this indicates that magnesium inhibits the precipitation of calcium carbonate. (Author)

**AD-622 600 Div. 2/9**
*OREGON STATE UNIV CORVALLIS DEPT OF OCEANOGRAPHY*
**ON THE OXYGEN SUPPLY OF THE DEEP PACIFIC OCEAN,**
by Peter K. Weyl. 1965, 6p. Contract Nonr128610 Grant ,NSF GP2044 Proj. NR083 102
Unclassified report

Pub. in Limnology and Oceanography v10 n2 p215-9 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Oxygen, Pacific Ocean), (*Pacific Ocean, Oxygen), Distribution, Sea water, Ocean currents, Transport properties, Oceanology

The existence of an oxygen minimum layer in the Pacific Ocean precludes vertical diffusion of oxygen from the surface to the deeper water. To maintain the known oxygen content, oxygen used in the deep water must be replenished by an inflow of relatively oxygen-rich water into the Pacific Ocean at high southern latitudes and an outflow of water with lower oxygen concentrations across the oxygen minimum surface. An estimate of the average rate of oxygen consumption gives a value for this flow of about 3 X 1,000,000 cu m/sec. (Author)

**AD-622 616 Div. 2/9 ,20/3 ,20/6**
*OREGON STATE UNIV CORVALLIS DEPT OF OCEANOGRAPHY*
**RADIOACTIVITY: DETECTION OF GAMMA-RAY EMISSION IN SEDIMENTS IN SITU,**
by David Jennings, Norman Cutshall, and Charles Osterberg. 23 Feb 65, 2p. Contract AT45 1 1750 Grant ,PHS 1T1WP59 01
Unclassified report

Pub. in Science v148 n3672 p948-50 May 14 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radioactivity, Ocean bottom), (*Gamma emission, Silt), (*Silt, Artificial radioactivity), (*Marine geology, Artificial radioactivity), Radiological contamination, Seacoast, Oregon, Rivers, Estuaries, Well logging, Ocean bottom sampling, Radioactive waste

A probe for measuring emission of gamma-rays in sediments in situ in water depths to about 35 meters was used to measure radioactivity in the Columbia River estuary and Oregon coastal areas. This technique offers some advantage over methods in which sediment samples are collected at sea and returned to the laboratory for radioanalysis. (Author)

**AD-622 689 Div. 2/9 ,4/4**
*OREGON STATE UNIV CORVALLIS DEPT OF OCEANOGRAPHY*
**EFFECT OF PHOTOSYNTHESIS AND RESPIRATION ON THE ELECTRICAL CONDUCTANCE OF SEA-WATER,**
by K. Park, and H. C. Curl,Jr., 1965, 2p. Contract Nonr128610 ,Grant NSF G23103 Proj. NR083 102
Unclassified report

Pub. in Nature v205 n4968 p274-5 Jan 16 1965 (Copies available only to DDC users).

Descriptors: (*Sea water, Electrical conductance), (*Electrical conductance, Sea water), Photosynthesis, Respiration, Marine biology, Photochemistry, Electrochemistry, Biochemistry

**AD-622 716 Div. 2/9**
*WOOSTER COLL OHIO*
**DROGUE MEASUREMENTS OF SHALLOW CURRENTS ON THE EQUATOR IN THE WESTERN ATLANTIC OCEAN,**
by M. C. Stalcup, and C. E. Parker. 26 Apr 65, 4p. Rept. no. reference no. 65-52
Contract Nonr219600 ,AT30 1 3010
Unclassified report

Pub. in Deep-Sea Research v12 p535-6 1965 (Copies available only to DDC users).

Descriptors: (*Ocean currents, Measurement), Towed bodies, Parachutes, Drift, Velocity, Atlantic Ocean, Oceanology, Marine meteorology

Parachute drogue measurements in the Atlantic Equatorial Undercurrent during February, March and April 1963 between 25 degrees and 35W at depths between 75 and 200 meters show velocities towards the east of up to 75 cm/sec. Surface currents during this period varied between 60 cm/sec towards the south-west to 60 cm/sec towards the east. This shift in direction of the surface flow may be related to the decrease in wind stress as the inter-tropical convergence moves through the area. (Author)

**AD-622 823 Div. 2/9 ,25/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*GM DEFENSE RESEARCH LABS SANTA BARBARA CALIF SEA OPERATIONS DEPT*
**UNDER-ICE ACOUSTICS AT HIGH FREQUENCIES.**
Technical rept. for period ending 31 Oct 65,
by Charles R. Greene. Oct 65, 25p. Rept. no. TR65-75
Contract Nonr432200
Unclassified report

Descriptors: (*Arctic regions, Acoustics), (*Acoustics, Arctic regions), (*Ice, Sound transmission), (*Underwater sound, Arctic regions), Ice islands, Test facilities, Hydrophones, Oceanographic equipment, Oceanographic data, High frequency, Noise, Naval research

An arctic field expedition was made to drifting station ARLIS IV, 120 miles north of Barrow, Alaska, in April 1965. Under-ice acoustic measurements of ambient noise, reverberation, absorption losses, and propagation were made and supporting data on water temperature, salinity, and ionic constituents were collected. The ambient noise level

at 19 kHz exceeded the Knudsen sea state six value for short intervals, but the levels at 34 and 42 kHz were not observed above the Knudsen values for sea state one. An active local ice field accounts for the high levels. Reverberation scattering strengths depend upon the presence of ice keels. Absorption coefficients at frequencies from 20 to 50 kHz are significantly lower than those predicted by Schulkin and Marsh's equation. (Author)

**AD-622 965 Div. 2/9 ,16/4**
*NARRAGANSETT MARINE LAB UNIV OF RHODE ISLAND KINGSTON*
**THE BIOLOGY OF THE SURFACE ZONE ZOOPLANKTON OF A BOREO-ARCTIC ATLANTIC OCEAN AREA.**
Technical rept.,
by William V. Kielhorn. 18 May 51, 44p. Rept. no. TR-3 Reference no. ,52-19
Contract Nonr39602
Unclassified report

Pub. in J. Fish. Res. Bd. Can., v9 n5 p223-64 1952 (Copies available only to DDC users). Rept. on Oceanic Biology Proj.

Descriptors: (*Marine biology, Arctic regions), (*Plankton, Arctic regions), Atlantic Ocean, Arctic Ocean, Newfoundland (Province), Hydrographic surveying, Oceanology, Oceanographic vessels, Fishes, Annelida

Zooplankton samples were taken from the surface zone waters of the central Labrador Sea at International Ocean Station 'B' (56 degrees-30minutes N., 51 degrees -00minutes W.) at weekly intervals throughout one calendar year for the purpose of determining the composition of the zooplankton, the seasonal progression, fluctuations and pertinent physical factors. An attempt was made to correlate the physical and biological factors. Ships of the United States Coast Guard and the Royal Canadian Navy were used as collecting units, and these were provided with nets, samplers and other equipment with which to carry out the shipboard phase of the investigation. Mid-day, 20 minute oblique hauls from 150-0 metres were made with the Clarke-Bumpus plankton sampler using No. 2 and No. 12 mesh silk nets, along with bathythermograph and Secchi disc lowerings. Later in the day, but at least one hour after dark, an open half-metre net 20 minute surface tow was made for additonal qualitative data. Bioluminescence records also were obtained at this time. (Author)

**AD-623 056 Div. 2/9 ,25/8**
*SCRIPPS INSTITUTION OF OCEANOGRAPHY UNIV OF CALIFORNIA LA JOLLA*
**ON HEAT TRANSFER THROUGH THE OCEAN FLOOR.**
Revised ed.,
by Elena A. Lubimova, Richard P. Von Herzen, and Gleb B. Udintsev. 2 Nov 64, 10p. Contract Nonr221623 Grant ,NSF G19239
Unclassified report

Pub. in Terrestrial Heat Flow Geophysical Monograph No. 8 p78-86 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 1 Aug 64.

Descriptors: (*Heat transfer, Ocean bottom), (*Oceanology, Heat transfer), (*Marine geophysics, Heat transfer), Earth, Oceans, Boundary layer, Thermal property

Heat flow from the Earth's interior may differ from measured values because of several disturbances in the environment on and near the ocean floor. The effects of water movements in and above the sediments are discussed in the light of recent temperature measurements of near bottom water. Super-adiabatic gradients have been observed near the ocean floor, suggesting convective overturns, although other factors may inhibit these. The velocity of interstitial water required to affect the surface heat flow is found to be several orders of magnitude less than previously suggested values, although still probably much greater than what is likely to occur. To obtain representative heat flow measurements, other controls are desirable to determine the effects of environment. Alternatively, a large number of observations should be made at a locality to reduce the effect of random variables. (Author)

**AD-622 571 See Fld. 14/5**

**AD-622 947 See Fld. 20/1**

## 8/11. SEISMOLOGY

**AD-622 573 Div. 2/10 ,2/8 ,20/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**GEOPHYSICAL IMPLICATIONS OF SHEAR DEFORMATION IN ROCKS.**
Special repts.,
by Robert E. Riecker. Jun 65, 35p. Rept. no. AFCRL-65-457 ,SR-27
Proj. 7639 ,ARPA Order 292 Task 763905
Unclassified report

Descriptors: (*Rock (Geology), Deformation), (*Seismology, Nuclear explosions), Geophysics, Shear stresses, Pressure, Temperature, Simulation, Presses (Machinery), Minerals, Compressive properties, Air Force research

The objective of the study is to determine shear strength, viscosity, and internal friction data for deep crust and upper mantle rock and mineral analogues under geophysically realistic conditions of very high temperatures and pressures. The data obtained through this study will be, initially, used to interpret earthquake origin and seismic signal generation; ultimately, it will be used to determine criteria that can be utilized to distinguish between natural earth phenomena and underground explosions.

**AD-622 794 Div. 2/10**
**CFSTI Prices: HC $2.00 MF $0.50**
*LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y*
**ESTABLISHMENT OF A LONG-PERIOD SEISMOGRAPH NETWORK UTILIZING MAGNETIC TAPE RECORDING.**
Final rept. for Jun 61-May 65,
by Paul W. Pomeroy. 1 Jun 65, 44p. Contract AF19 604 8485 Proj. 8652 ,ARPA order 292 Task 865207
AFCRL , 65-527
Unclassified report

Descriptors: (*Seismology, Magnetic recording systems), (*Magnetic recording systems, Seismology), Seismographs, Seismological stations, Global communication systems, Data processing systems, Earthquakes, Nuclear explosions, Identification systems

A worldwide network of long-period seismographs recording on magnetic tape has been established, including stations at Mt. Tsukuba, Japan; Honolulu, Hawaii; Uppsala, Sweden; Huancayo, Peru; College, Alaska; Canberra, Australia; and Palisades, New York. At these stations the amplified outputs of 3-component 15-second transducers are recorded at two gain levels on tape recorders operating at .06 inches per second. These units provide 16 2/3 days of recording time per reel with a bandwidth of DC to 10 cps and a signal-to-noise ratio of 60 db. This worldwide network continues in operation at the present time. Analysis techniques developed and/or utilized for data analysis in this program include: (a) high-, low- and bandpass filtering; (b) inverse filtering; (c) Fourier analysis, (d) rotation of instrumental axes, (e) cumulative energy, (f) longitudinal-vertical product for particle motion, (g) angles of emergence and azimuth, and (h) direction of microseism approach and beam width. Studies of particular interest to the VELA-UNIFORM program include: (a) contouring of total energy and ratio of high-frequency-to-low-frequency energy for the Hardhat and Gnome underground nuclear events and comparison with data from the New Madrid and Hebgen Lake earthquakes, (b) the determination of experimental radiation patterns for Love and Rayleigh waves (both amplitude and phase) for several underground nuclear explosions and the comparison of the observed data with theoretical models. (Author)

**AD-622 936 Div. 2/10**
**CFSTI Prices: HC $2.00 MF $0.50**
*AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C*
**SEISMOLOGY AND SEISMIC MODELING: COMPILATION OF REVIEWS.**
Rept. no. 3 on AID Work assignment no. 35, task 17.
4 Aug 64, 48p. Rept. no. ATD-U-64-84
TT , 65-64281
Unclassified report

Trans. of Akademiya Nauk SSSR. Institut Fiziki Zemli. Trudy, n30 (197) 1963. Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Seismology, USSR), Seismic waves, Models (Simulations), Earth, Propagation, Absorption, Geology, Reviews

During the past few years most of the progress made in the USSR in the field of model seismology has been in applying to seismic wave studies instruments and techniques which until recently had been only in the development stage. The experiments and research on the dynamics of seismic waves in real geologic media described in this report were carried out in the Department of Seismic Surveying Methods of the Institut fiziki Zemli. The liquid-solid models used throughout these tests were particularly advantageous because they were simple and provided a good contact between the model and the transducers and permit facilitating a quantitative study of wave dynamics. However, the fact that transverse waves are not propagated in water and, at the frequencies used, are characterized by low absorption, had to be taken into account in evaluating the results of the studies. (Author)

**AD-622 946 Div. 2/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*CALIFORNIA INST OF TECH PASADENA SEISMOLOGICAL LAB*
**STUDY OF FREE AND FORCED OSCILLATIONS OF THE EARTH.**
Final rept. for 1 Oct 63-31 Jan 65.
31 Jan 65, 4p. Contract AF49 638 1299 Proj. arpa order 292 63
Unclassified report

Descriptors: (*Seismology, Instrumentation), (*Earth, Oscillation), Seismographs, Earthquakes, Seismic waves

The report describes a rotational seismometer, a mercury pendulum and a strain seismograph. Also described are long-period waves from the Alaskan earthquake.

**AD-622 977 Div. 2/10**
**CFSTI Prices: HC $2.00 MF $0.50**
*COAST AND GEODETIC SURVEY SAN FRANCISCO CALIF SEISMOLOGICAL FIELD SURVEY*
**ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST AND THE WESTERN MOUNTAIN REGION.**
MSA-76, 1 Oct-31 Dec 52.
Dec 52, 36p.
Unclassified report

Descriptors: (*Earthquakes, United States), (*Seismology, Earthquakes), Seismic waves, California, Nevada, Washington, Oregon, Mountains, Abstracting

**AD-622 978 Div. 2/10**
**CFSTI Prices: HC $5.00 MF $1.00**
*COAST AND GEODETIC SURVEY SAN FRANCISCO CALIF SEISMOLOGICAL FIELD SURVEY*
**ABSTRACTS OF EARTHQUAKE REPORTS FOR THE PACIFIC COAST AND THE WESTERN MOUNTAIN REGION.**
MSA-75, 1 Jul-30 Sep 52.
1952, 167p.

Unclassified report

Descriptors: (*Earthquakes, Reports), California, Nevada, Oregon, Washington, Seismology

**AD-622 712 See Fld. 4/2**

**AD-622 980 See Fld. 19/4**

## 8/14. TERRESTRIAL MAGNETISM

**AD-622 422 Div. 2/6 ,2/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**INVESTIGATION OF DRIFT IN THE E REGION OF THE IONOSPHERE,**
by O. Ovezgeldyev, and L. P. Korsunova. 17 Sep 65, 12p. Rept. no. FTD-TT-65-767
TT , 65-64169

Unclassified report

Unedited rough draft trans. of Akademiya Nauk Turkmenskoi SSR, Ashkhabad. Izvestiya. Seriya Fiziko-Tekhnicheskikh, Khimicheskikh i Geologicheskikh Nauk, n2 p21-6 1964.

Descriptors: (*Ionosphere, Magnetohydrodynamics), (*Magnetohydrodynamics, Ionosphere), (*Terrestrial magnetism, Diurnal variations), Electrostatics, Atmospheric electricity, Drift, Harmonic analysis, USSR

The dynamo theory of geomagnetic variations is discussed.

**AD-622 886 Div. 2/6 ,25/5 ,2/1**
*PALMER PHYSICAL LAB PRINCETON UNIV N J*
**GRAVITATION AND SPACE SCIENCE,**
by R. H. Dicke, and P. J. Peebles. 8 Mar 65, 47p.

Unclassified report

Pub. in Space Science Reviews v4 p419-60 1965 (Copies available only to DDC users). Research supported in part by National Science Foundation and Office of Naval Research.

Descriptors: (*Gravity, Relativity theory), (*Relativity theory, Gravity), Galaxies, Radio astronomy, Astronomy, Field theory

The relations between relativity and gravitation are developed. It is shown how space science may someday improve knowledge of gravitation. Important relativistic questions are shown to be involved in considerations of cosmology and radio galaxies.

**AD-622 538 See Fld. 4/2**

## 9/1. COMPONENTS

**AD-622 330 Div. 8/2 ,8/3**
**CFSTI Prices: HC $3.00 MF $0.75**
*CASE INST OF TECH CLEVELAND OHIO*
**OPTIMIZATION OF THE FIALKON-GERST MULTIPORT RC TRANSFER FUNCTION SYNTHESIS.**
Scientific rept.,
by D. Hazony, and D. Hilberman. 1965, 77p.
Rept. no. SR-10
Contract AF19 628 1699 Proj. 5635 Task 563501
AFCRL , 65-555

Unclassified report

Descriptors: (*Electrical networks, Synthesis), (*Optimization, Synthesis), Functions, Matrix algebra, Programming (Computers), Vector analysis, Resistance (Electrical), Capacitance

A method is presented which reduces the number of components needed in a Fialkow-Gerst multiport RC transfer function synthesis. A relationship is determined between the number of non-zero numerator coefficients in the transfer function vector and the number of components used in the synthesis of that vector. (Author)

**AD-622 346 Div. 8/4 ,8/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**A DEVICE FOR DELAYING IMPULSES,**
by V. P. Antipenkov. 24 Sep 65, 6p. Rept. no. FTD-TT-65-469
TT , 65-64138

Unclassified report

Unedited rough draft trans. of Russian Patent 158 153, appl. no. 803153/26-24, 14 Nov 62.

Descriptors: (*Delay circuits, Cold cathode tubes), Thyratrons, Anodes (Electron tubes), Coupling circuits, Patents, USSR

The device for delaying impulses consists of a cold cathode thyratron with anodes connected together through the resistance to the power source and connected to the circuit of RC cathodes by a ladder network. The device is different in that, to increase the accuracy of work in measuring feed voltages, a comparator (on the output of which a signal arises at the moment the cathode potentials are balanced) is connected between the cathodes of the thyratrons. (Author)

**AD-622 405 Div. 8/2 ,30/3 ,7/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*HARRY DIAMOND LABS WASHINGTON D C*
**TM RESEARCH PROGRAM. HIGH-G TESTS OF COMPONENTS.**
Technical memo.,
by Neil D. Wilkin. 1 Jul 65, 24p. Rept. no. TM-65-33
Proj. DA1L013001A91A ,HDL A0200

Unclassified report

Descriptors: (*Telemeter systems, Acceleration), (*Alkaline cells, Acceleration), (*Diodes, Acceleration), (*Electric connectors, Acceleration), Telemetering transmitters, Storage batteries, Impact shock, Performance (Engineering), Gravity, Strain (Mechanics), Cadmium, Silver, Nickel, Electric insulation, Vinyl plastics

The report covers one portion of continuing research to determine performance capabilities of various telemetry components and subsystems under high acceleration. Tests were made to obtain data on the behavior of silver and nickel-cadmium cells, gas breakdown diodes, and associated equipment needed in developing more efficient telemetry systems. Data obtained during lead-impact tests indicate that the cells can survive gun-launch accelerations up 60,000 g and operate during an 8-min period after firing. The diodes and a high-frequency power transistor show survival capability without internal potting. The rate of failure of vinyl-covered electrical leads makes their use questionable. Techniques are recommended for making further tests of TM components and subsystems. (Author)

**AD-622 406 Div. 8/4**
**CFSTI Prices: HC $6.00 MF $1.25**
*GENERAL ELECTRIC CO SYRACUSE N Y ELECTRONICS LAB*
**LARGE-AREA ELECTRONIC DISPLAY PANEL.**
Rept. no. 12 (Final), 1 Jun 62-31 May 65,
by J. W. Brouillette, R. B. Gethmann, A. W. Edson, and M. L. Noble. 31 May 65, 246p. Contract DA36 039sc90755 Task DA 1G6 22001A055 03

Unclassified report

Descriptors: (*Display systems, Electronic equipment), (*Electron beams, Display systems), Deformation, Thermoplastics, Optical equipment, Electron guns, Electron optics, Fiber optics, Cathode ray tube screens, Optical images, Focusing, Films, Photographic recording systems, Xenon lamps, Prisms (Optics)

The objective of the Project is to advance the state-ofthe-art of Large-Area Electronic Display by developing a new high-resolution electron beam deformation system for thermoplastic film and a novel optical projection system. A total internal reflection projection system (TIRP) is being developed which will project a 50 x 50 mm format with 3,000 resolvable elements per side dimension to an 8 x 8 foot screen with a light flux in excess of 2,000 lumens. This novel optical projection system permits simultaneous writing and projection in the same station with a high resolution magnetic-deflection electron gun. An objective with this performance is presently being fabricated. Electron optical development has produced an electron gun capable of writing a 3,000 line raster in one-half second on thermoplastic. This gun has successfully recorded 18.87 mc video using stretch modulation. Dynamic corrective waveforms are required. The main effort on electron optics, is aimed at achieving uniform records and acceptable stability under conditions of single-frame writing. (Author)

**AD-622 418 Div. 8/2 ,8/4 ,5/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**COMMUNICATION SATELLITE OUTPUT DEVICES,**
by N. E. Feldman. Jun 65, 49p. Rept. no. P-2997-1

Unclassified report

Descriptors: (*Radiofrequency generators, Microwave equipment), (*Communication satellites (Active), Radiofrequency generators), (*Semiconductor devices, Radiofrequency generators), (*Electron tubes, Radiofrequency generators), Tunnel diodes, Varactor diodes, Transistors, Transistor amplifiers, Frequency multipliers, Microwave amplifiers, Triodes, Klystrons, Traveling-wave tubes, Crossed field devices, Backward-wave amplifiers, Radiofrequency power

A communication satellite operating at microwave frequencies is not constrained to the use of a vacuum tube for generating an output signal. Semiconductor devices are available with improved resistance to damage by charged particle flux, and semiconductor circuits are available whose performance is less influenced by temperature variation. Similarly, extremely light weight vacuum tubes have been developed which utilize heat transfer without fluid flow. In general, for communication satellite operations, either type of device must have a long operating life with high reliability at the lowest possible cost in system weight. The cost in system weight in this case includes the weights of the output stage, any high level driver stages which may be necessary, the associated voltage conversion and regulation equipment and the associated prime power or energy source. This paper concerns the relative ability of semiconductor devices, such as tunnel diodes, transistors, and varactor diodes and vacuum tube amplifiers such as triodes, klystrons, amplitrons and TWTs to gener-

ate signal power efficiently at frequencies of 1 to 10 kMc and power levels of 0.1 to 100 watts.

**AD-622 419 Div. 8/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*THOMAS ELECTRONICS INC PASSAIC N J*
**STUDY AND INVESTIGATION OF A PORTED COLOR CATHODE RAY TUBE.**
Final rept.,
by Peter Seats, Thomas Kegelman, Victor Legendre, and Perry Shegerian. Sep 65, 76p. Contract AF30 602 3513 Proj. 5597 Task 559703
RADC , TR-65-112
Unclassified report

Prepared in cooperation with Norden Div., United Aircraft Corp., Norwalk, Conn.

Descriptors: (*Color television tubes, Feasibility studies), Cathode ray tubes, Crystal oscillators, Photomultipliers, Scintillation counters, Pulse discriminators, Wiring diagrams, Design, X-rays, Phosphorescent materials

A combined analytical and experimental study has been conducted to determine the feasibility of building a 23-inch rear-ported full color monitor employing the 'Goodman' x-ray beam indexing principle. The study has resulted in the development of a large experimental tube incorporating a 2 inch beryllium window, which in conjunction with a scintillator/pmt detector has provided high-speed x-ray index pulses. Circuits have been devised to process the index signal to time color video pulses to the crt grid. Simultaneous rear projection has also been demonstrated in the experimental tube. A 1000 color line tube and circuit capability is projected. (Author)

**AD-622 424 Div. 8/2 ,25/6**
**CFSTI Prices: HC $3.00 MF $0.75**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**THE USE OF METAL-OXIDE-SEMICONDUCTOR FIELD EFFECT TRANSISTORS (MOST) IN COMPLEMENTARY CONFIGURATIONS.**
Master's thesis,
by Roger Andre Gagnon. Aug 65, 75p. Rept. no. GE/EE/65-9
Unclassified report

Descriptors: (*Transistors, Performance (Engineering)), Metals, Oxides, Mathematical analysis, Configuration, Modulators, Frequency multipliers, Transistor amplifiers, Demodulators

The metal-oxide-semiconductor field effect transistor (MOST) extends scope of complementary circuits because the enhancement device conducts under different (but complementary) conditions from those of the depletion device. Twenty-two MOST equivalents to ten existing bipolar complementary configurations were found in a nonexhaustive comparison. An empirical equation was found for the MOST characteristics. One typical configuration was 'analyzed using the empirical equations with good comparison to test results. Five applications of the configuration were investigated: A.M. modulator, pulse amplitude modulator, multiplier, amplifier with a voltage controlled gain (positive or negative), and product detector. 'Author)

**AD-622 437 Div. 8/4 ,26/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*NATIONAL CO INC MELROSE MASS*
**PRODUCTION ENGINEERING MEASURE FOR CESIUM BEAM TUBES.**
Quarterly progress rept. no. 8, 23 Feb-23 May 65, by James George. 23 May 65, 33p. Contract DA36 039AMC01457
Unclassified report

See also AD-614 611.

Descriptors: (*Cesium electron tubes, Manufacturing methods), Life expectancy, Environmental tests, Electron tube heaters, Signal-to-noise ratio, Demodulators, Performance (Engineering), Quality control

The life test of the retrofitted PEM-E3 cesium beam tube was continued with satisfactory results. With two exceptions, the new PEM-E6 tube successfully withstood environmental testing. System evaluation of the new PEME5 and PEM-E6 tubes in tri-service atomic frequency standards disclosed that the signal-to-noise ratios of these tubes were inadequate for the bandwidth of the electronics. Redesign of the tubes was completed. The quality assurance division continued preparation of test procedures, tube specifications, and processing instructions for the manufacturing phase of the PEM program. Release of drawings to the manufacturing division was continued during this reporting period. (Author)

**AD-622 487 Div. 8/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**GUIDE FOR MICROELECTRONIC CIRCUIT AND SYSTEM DESIGN,**
by Stanley H. Gordon. 17 Mar 64, 44p. Rept. no. CF-3072
Contract NOw62 0604c
Unclassified report

Descriptors: (*Circuits, Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Circuits), Design, Films, Semiconductor devices, Resistors, Capacitors, Modules (Electronics), Reliability (Electronics), Packaged circuits, Encapsulation

The paper presents information necessary for an electronic designer to begin to design microelectronic circuits and systems. The information falls into three categories: fabrication -of microelectronic circuits, characteristics of the various microelectronic approaches and circuit or system design rules for each of the various microelectronic approaches.

**AD-622 488 Div. 8/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**STUDIES OF INTERMEDIATE FREQUENCY SOLID STATE LIMITERS DESIGNED FOR MINIMIZATION OF PHASE CHANGES,**
by J. H. Kuck, W. Zinger, and W. Massey. 19 Feb 64, 35p. Rept. no. CF-3069
Contract NOw62 0604c
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale. Prepared in cooperation with Armour Research Foundation, Chicago, Ill.

Descriptors: (*Limiters, Intermediate frequency), (*Phase shift, Limiters), (*Semiconductor devices, Limiters), Transistors, Diodes (Semiconductor), Narrowband, Broadband

Three approaches are investigated to the design of a solid state 30MC limiter exhibiting negligible phase change (less than ten degrees) as input signal level is varied from small signal region to maximum input. Series diodes, shunt diodes, and transistors are studied as limiters.

**AD-622 509 Div. 8/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*GENERAL ATRONICS CORP PHILADELPHIA PA ELECTRONIC TUBES AND INSTRUMENT DIV*
**THE DESIGN, DEVELOPMENT, AND FABRICATION OF A MINIATURE FIBEROPTIC FACEPLATE CATHODERAY TUBE FOR USE IN MICRO-DISPLAY.**
Final development rept. for May 63-31 Oct 65. 1 Nov 65, 60p. Contract NObsr89280 Proj. SR0008035 Task 9477
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale. See also AD-428 822.

Descriptors: (*Cathode ray tube screens, Fiber optics), (*Fiber optics, Cathode ray tube screens), (*Cathode ray tubes, Miniature electron tubes), Electron optics, Electron guns, Phosphorescent materials, Deflection, Sensitivity, Resolution, Design

An attempt was made to design, develope, and produce two samples of a short, miniature, high resolution fiber optic face plate cathode-ray tube of high deflection sensitivity and low grid drive for use in a 'micro display'. The use of the 'ballistic' or folded electron optics principle was attempted in order to obtain in a very short tube the equivalent characteristics of a tube at least twice as long. Time and funds ran out before samples of this design could be produced. The tubes produced to implement the production phase of the contract are of the conventional straight line design.

**AD-622 519 Div. 8/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*ITT FEDERAL LABS NUTLEY N J*
**50 TO 500 MC FREQUENCY SYNTHESIZER.**
Progress rept. no. 6, 1 Jul-1 Aug 65,
by D. Himes. Aug 65, 5p. Contract NObsr93083 Proj. SS294001 Task 9219
Unclassified report

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Descriptors: (*Frequency, Synthesis), (*Radiofrequency oscillators, Frequency shift), Very high frequency, Ultrahigh frequency, Radiofrequency generators, Frequency dividers, Frequency multipliers, Radiofrequency filters, Stability, Switching circuits, Electronic switches

The reports presents a block diagram for the 50500 MC synthesizer.

**AD-622 556 Div. 8/2 ,30/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**AN EXPERIMENTAL CURRENT-PROBE SYSTEM FOR MEASURING CONDUCTED RADIO-FREQUENCY INTERFERENCE FROM 20 KC TO 80 MC.**
Final technical rept. for Jan 60-Mar 65,
by J. L. Brooks. Oct 65, 41p. Rept. no. TR-R-405
Proj. Y F006 09 02 205
Unclassified report

See also AD-601 895.

Descriptors: (*Radiofrequency interference, Measurement), (*Probes (Electromagnetic), Design), Measuring devices (Electrical + electronic), Electrical impedance, Phase meters, Noise (Radio), Circuits, Electrical equipment, Phase measurement, High frequency, Low frequency

New and improved techniques and circuits based on newly developed instrumentation have been devised for adequately performing conducted radio-frequency-interference (RFI) acceptance and compatibility tests on electrical equipment. Tests made to military specifications which have been used in the past as guides for this type of testing have been found to be inadequate for determining the compatibility of tested equipment with electromagnetically sensitive equipment connected to the same power circuit or interconnected in a

common system. The new development, based on the current probe technique and involving measurements of noisesource impedances, load impedances, and noise currents, now enables one to specify completely in terms of the fundamental units of power the conducted RFI characteristics of the device under test. An impedance and phase meter was designed which covers the frequency range of 20 kc to 80 Mc and an impedance range of 10 to 10,000 ohms at 0 to 360 degrees. Functional utilization of the new techniques will require that applicable performance requirements be incorporated into appropriate military specifications. More explicit acceptability limits may now be specified. Recommended revisions are defined. An evaluation of the hardware developed is presented as well as examples of RFI measurements. Complete circuit diagrams are provided. (Author)

**AD-622 574 Div. 8/4 ,8/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*ZENITH RADIO RESEARCH CORP MENLO PARK CALIF*
**TRANSVERSE-WAVE HIGH-POWER TUBE.**
Quarterly rept. no. 1, 1 Apr-30 Jun 65,
by C. Burton Crumly, and Roy A. Larsen. Jul 65, 44p. Contract DA28 043AMC01268E Proj. DA1P6 22001A005 Task DA1P6 22001A005 04
ECOM , 01268-1

Unclassified report

Descriptors: (*Traveling-wave tubes, Power amplifiers), (*Power amplifiers, Traveling-wave tubes), (*Electron optics, Traveling-wave tubes), (*Waveguides, Travelingwave tubes), Electron beams, Propagation, Cyclotron waves, Broadband, S band, Impedance matching, Electron tube parts, Feasibility studies

Research and development work has begun on a novel type of traveling-wave power amplifier tube, employing transverse-wave interaction between the negative synchronous wave and a circuit wave on a balanced structure. The theoretical advantage in this arrangement is the possibility of high-power amplification with high overall efficiency, due to the lack of longitudinal or transverse velocity modulation in the spent beam. No d-c pumping process is involved, so that such a tube would be free from noiseorbit pumping or beam blowup, such as occurs in the Larmotron and the Bass tube. Theoretical and experimental work on a scale model of a twisted, finned, ridged, circular waveguide has shown that an appropriate dispersion curve, as well as adequate interaction impedance, can be obtained at S-band. Design work is continuing with the objective of demonstrating the feasibility of a 1-kw CW output power, at an efficiency of at least 60%, using a depressed collector. (Author)

**AD-622 630 Div. 8/2 ,22/7 ,30/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*HARRY DIAMOND LABS WASHINGTON D C*
**HIGH-G TIME BASES,**
by Henry P. Kalmus. 16 Aug 65, 22p. Rept. no. TR-1299
Proj. DA1L013001A91A ,HDLA0200

Unclassified report

Descriptors: (*Timing devices, Oscillators), (*Oscillators, Timing devices), Phase shift, Low frequency, Frequency stabilizers, Limiters, Feedback amplifiers, Circuits, Clocks, Time, Standards, Military requirements, Gravity

For many military applications, low frequency oscillators (approx 100 Hz) are required which maintain their frequency within 5 parts in 10,000 after they have been exposed to an acceleration of 30,000 g for 100 ms, and also after a storage period of 5 yr. In addition, the same stability must exist over the total military temperature range while a constant acceleration of, say, 5000 g in any direction is applied for about 200 sec. The characteristics of mechanical systems and various electrical circuits proposed for the time bases will be summarized. It will be shown that oscillators, based on the use of RC networks and solidstate negative feedback amplifiers, can fulfill the requirements. It will also be shown that, for cost reduction, the conventional amplitude control over many cycles can be replaced by an instantaneous limiter without detrimental effects on stability. (Author)

**AD-622 683 Div. 8/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*MICROWAVE ASSOCIATES INC BURLINGTON MASS*
**INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.**
Quarterly progress rept. no. 11, 16 May-15 Aug 65,
by H. S. Maddix. 15 Aug 65, 34p. Contract DA36 039AMC00097E Proj. DA1G6 22001A055 04

Unclassified report

Descriptors: (*Discharge tubes, Gas discharges), (*Sorption, Discharge tubes), (*Gas discharges, Microwave equipment), Electronic switches, Mass spectroscopy, Glow discharges, Diffusion, Argon, Ammonia, Water vapor, Hydrogen

Clean-up of mixtures of argon, ammonia, water vapor, hydrogen, and air in a TR tube were investigated with the aid of a mass spectrometer. The following types of cleanup were observed over a 20-300C temperature range: (1) initial physical and chemical adsorption, (2) clean-up due to a glow discharge at a stainless steel electrode, (3) clean-up due to a 1 watt RF discharge between nickel cones, and (4) clean-up due to a 10 watt RF discharge at a window composed of 7070 glass sealed to a kovar iris. Clean-up of argon was small compared to clean-up observed for the remaining gases. Initial physisorption of ammonia and water vapor occurred compared to initial chemisorption of oxygen in an air-argon mixture. The discharges produced dissociation of NH3 and H2O followed by diffusion controlled clean-up of H2. In air the discharges caused chemisorption of oxygen. Diffusion controlled thermal recovery of H2 was observed following termination of the 10 watt H2 and NH3 discharges. No thermal recovery occurred following H2O and air discharges in which O2 was chemisorbed. The relationship between the role of dissociative attachment of electrons to reduce signal recovery time and the subsequent clean-up of the dissociation products is discussed. (Author)

**AD-622 697 Div. 8/2 ,30/2 ,8/7**
**CFSTI Prices: HC $4.00 MF $0.75**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**ANALOG AND DIGITAL COMPUTER ANALYSIS OF THE RANDOMLY EXCITED DUFFING EQUATION.**
Master's thesis,
by Gene Darwin Bowling. Aug 65, 109p. Rept. no. GE/EE/65-5

Unclassified report

Descriptors: (*Nonlinear differential equations, Simulation), (*Correlators, Signal-to-noise ratio), (*Programming (Computers), Nonlinear differential equations), Analog computers, Digital computers, Time-lag theory, Noise generators

Analog and digital computer techniques are used to measure the autocorrelation of the low frequency response of the non-linear Duffing equation excited by Gaussian white noise. An analog computer was used to simulate the Duffing equation, to create the time delay by simulating a modified form of the Pade Approximation, and to calculate the autocorrelation. The autocorrelation and power spectrum were calculated on a digital computer using the output from the Duffing equation simulated on the analog computer. The autocorrelation results are presented graphically. The autocorrelation was determined for two values of input noise voltage level, for under-damped and over-damped cases, and for values of the coefficient of the non-linear term B, of 0,0.01, 0.1, 1.0, and 10.0. The mean square value of the response is reduced in amplitude and the autocorrelation curve approaches the zero axis at a faster rate when either the input noise voltage level or the value of B is increased. A comparison of the measured and theoretical values when B is equal to zero show the analog computer results to be very accurate and the digital computer results to be less accurate. (Author)

**AD-622 713 Div. 8/2**
**CFSTI Prices: HC $3.00 MF $0.75**
*NEW YORK UNIV N Y LAB FOR ELECTRO-SCIENCE RESEARCH*
**SYNTHESIS AND DESIGN OF A CLASS OF MINIMUM SENSITIVITY ACTIVE NETWORKS FOR MICROELECTRONICS.**
Scientific rept.,
by John J. Golembeski. Aug 65, 78p. Rept. no. SR-19 ,TR-400-116
Contract AF19 628 379 Proj. 5628 Task 562806
AFCRL , 65-578

Unclassified report

Descriptors: (*Circuits, Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Circuits), Design, Amplifiers, Configuration, Gain, Sensitivity, Band-pass amplifiers, Reliability (Electronics)

An amplifier configuration is presented which has particular advantages for microcircuit realization. The arrangement described is capable of yielding a fractional gain change which is equal to the product of the fractional deviations in the gains of each of the redundant signal channels. The nominal input-output transmission is maintained, even with complete failure of one or more (but not all) of the signal channels, at the expense of an increase in sensitivity. This sensitivity to large parameter changes can be minimized over an appreciable portion of the amplifier passband by the use of a systematic design procedure which is included. (Author)

**AD-622 753 Div. 8/4 ,8/2**
*AUTONETICS ANAHEIM CALIF*
**A GENERAL CATALOG OF GAIN, BANDWIDTH AND NOISE TEMPERATURE EXPRESSIONS FOR FOURFREQUENCY PARAMETRIC DEVICES.**
Revised ed.,
by D. B. Anderson, and J. C. Aukland. 1 Aug 62, 19p.

Unclassified report

Pub. in IEEE Transactions of the Professional Technical Group on Electron Devices vED10 n1 p13-30 Jan 1963 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 13 Apr 62.

Descriptors: (*Transducers, Performance (Engineering)), (*Gain, Transducers), (*Bandwidth, Transducers), (*Noise (Radio), Transducers), Electrical conductance, Power, Voltage, Pumping (Electronics), Parametric amplifiers

Performance expressions are tabulated for four-frequency parametric devices. Within the bounds of the assumptions and with a consistent nomenclature, expressions are written for: available and transducer power gain, bandwidth, gain-bandwidth product, input and output conductance, midband effective noise temperature, and phase relations. The four-frequency devices are considered because they encompass both the negative conductance and the frequency ratio mechanisms of parametric amplification. These performance expressions are written for the nine possible configurations of ports and spectrum modes of the four-frequency devices which enables an orderly compari-

son. By proper termination of the idler port in these expressions, eight additional cases arise for the three- and two-frequency parametric devices. The special nomenclature, the terminology, and the assumptions are defined. Only the procedure to derive the various types of expressions is illustrated. The catalog has been intentionally prepared to compare the various operational modes of parametric devices with rigorous inclusion of the nonlinear reactance element losses or without specific emphasis on low-noise operation which obscures the distinctive features of each operational mode. (Author)

**AD-622 763 Div. 8/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**THE INTERCHANGEABILITY OF VACUUM TUBE AND SEMICONDUCTOR INSTRUMENTS,**
by B. V. Katsnelson. 28 Sep 65, 12p. Rept. no. FTD-TT-65-897
TT, 65-64249
Unclassified report

Unedited rough draft trans. of Standardizatsiya (USSR) v29 n9 p43-6 1964.

Descriptors: (*Electron tubes, Compatibility), (*Semiconductor devices, Compatibility), Standards, USSR, Transistors, Test methods, Electron tube sockets, Electron tube parts

Uniformity among test methods, and their standarization for interchangeability of such electronic instruments as radio tubes and transistors, are stressed since interchangeability of such instruments is believed attainable only when they are checked in comparable, identical conditions. The following Russian standards are listed as contributing to the possibility of interchange: junction dimensions for prongs of vacuum tubes, GOST 784264, for octal tube sockets, GOST 2790-64, and for miniature sockets, GOST 10777-64; GOST 345-64 for plastic heads for sockets of vacuum tube instruments; GOST 2182-63 for the filament and anode voltages of vacuum tube instruments with solid incandescent cathode; GOST 7428-63 for the requirements for radio tubes with an anode that continuously dissipates power up to 25 watts; and GOST 7842-64 for the positioning and junction dimensions of prongs of vacuum tubes. Efforts toward compatiblity with the regulations of the International Electronic Commission are also mentioned.

**AD-622 779 Div. 8/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**CHEMICALLY DEPOSITED FERRITE FILMS AS NON-RECIPROCAL ELEMENTS IN AN EXPERIMENTAL RESONANCE ISOLATOR.**
Technical rept.,
by Richard Stern, William L. Wade,Jr., Thomas Collins, and William J. Skudera,Jr.. Aug 65, 18p. Rept. no. ECOM-2622
Proj. 1P6 22001A057 02 Task 1P6 22001A057 02 05
Unclassified report

Descriptors: (*Ferrites, Films), (*Films, Ferrites), (*Electromagnetic shielding, Films), Nickel compounds, Zinc compounds, Magnesium compounds, Oxides, Extremely high frequency, Microwave equipment, Millimeter waves, Magnetic properties, Preparation

Nickel, nickel zinc, and magnesium zinc ferrite thin films have been prepared singly and in combination utilizing chemical deposition techniques. These films, deposited on alumina substrates were then tested as nonreciprocal elements in an experimental resonance isolator in the 35 Gc frequency region. Device performance as well as the magnetic properties and crystallographic analysis is included. (Author)

**AD-622 803 Div. 8/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*MICROWAVE ELECTRONICS CORP PALO ALTO CALIF*
**ONE-WATT CW S-BAND TRAVELING-WAVE TUBE WITH 6-DB NOISE FIGURE.**
Final rept. for May 63-Feb 65,
by Norman Berger. Oct 65, 49p. Contract AF30 602 3025 Proj. 5573 Task 557301
RADC, TR-65-260
Unclassified report

See also AD-620 853.

Descriptors: (*Traveling-wave tubes, S band), Noise (Radar), Radiofrequency power, Helixes, Electron guns, Cathodes (Electron tubes), Microwave amplifiers, Performance (Engineering), Gain

An ultralow-noise, medium-power traveling-wave tube was successfully built. The noise figure achieved was below 7.0 db, the power output 1-watt across the full S-band octave. A unique dual-helix approach was used. An electron gun for high-current-density operation was developed and a velocity taper on the output helix increased the power output. (Author)

**AD-622 821 Div. 8/2 ,26/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*FAIRCHILD SEMICONDUCTOR DIV FAIRCHILD CAMERA AND INSTRUMENT CORP MOUNTAIN VIEW CALIF*
**PRODUCTION ENGINEERING MEASURE FOR IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY FOR PNP INTERMEDIATE POWER SILICON PLANAR SWITCHING TRANSISTORS INCLUDING 2N3502.**
Quarterly progress rept. no. 2, 1 Apr-30 Jun 65,
by W. McKeown, N. Walker, D. Floyd, and G. Potts. 30 Jun 65, 35p. Contract DA36 039AMC06155E
Unclassified report

See also AD-617 893.

Descriptors: (*Transistors, Manufacturing methods), Reliability (Electronics), Silicon, Processing, Oxidation, Films, Conveyors, Jigs, Ceramic coatings, Oxides

The report describes the primary experiments on the deposition of an SiO2 layer in a horizontal epitaxial reactor and indicates the parameters affecting the uniformity of growth rate along the deposition boat. Work on the semiautomatic line was performed as scheduled. Completion of design was followed by installation of the entire system. A precise correlation between sheet resistance (V/I) and Beta distribution was established and used as a tool in further development. Temperature gradient across a wafer during predeposition operations was found to be the most significant cause of Beta variation. Wafers processed in flat position have shown the least amount of Beta variation.

**AD-622 827 Div. 8/4 ,26/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*BOMAC DIV VARIAN ASSOCIATES BEVERLY MASS*
**PRODUCTION ENGINEERING MEASURE FOR LOW FIELD MAGNETRON BL-234C.**
Quarterly progress rept. no. 1, 28 Apr-28 Jul 65,
by Arnold M. Eklund. 28 Jul 65, 45p. Contract DA36 039AMC06162E
Unclassified report

Descriptors: (*Magnetrons, Manufacturing methods), Magnetic fields, Radiofrequency power, Anodes (Electron tube), Cathodes (Electron tube), Performance (Engineering), Machining

Fabrication of the first five engineering model tubes has been initiated. Two tubes have been completed through hot test. The first tube, although jitter free, has low peak power output of about 300 watts. The second tube has achieved an exceptionally high power output of 760 watts peak and is essentially jitter free. As part of the consideration given to cost reduction of tube parts and materials, investigation of a directly heated cathode design has been initiated with the intent of utilizing either a standard barium impreganted dispenser cathode of the 'SEMBO' cathode. Conventional machining of anodes by potting hobbed anode blands has been started. Some preliminary machining operations using Palmer Products Plastic ERL-2795 show promise. A management evaluation program in the form of a PERT control system has been completed. The double vacuum exhaust station, as described under Provision G of the subject contract, has been delivered. Re-design has been formulated to increase the vacuum processing capabilityes for the BL-234C over the present capability. (Author)

**AD-622 877 Div. 8/4 ,26/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*ITT ELECTRON TUBE DIV ROANOKE VA*
**PRODUCTION ENGINEERING MEASURE FOR TYPE FW-202 BARRIER GRID STORAGE TUBE.**
Quarterly progress rept. no. 13, 1 Jul-30 Sep 64,
by D. D. Duggan. 30 Sep 64, 68p. Contract DA36 039sc85967
Unclassified report

Descriptors: (*Storage tubes, Manufacturing methods), Production, Tests, Performance (Engineering), Electron beams, Electron guns, Life expectancy, Electron tube parts

The formal preproduction testing of the six preproduction samples tubes has been accomplished. The tooling for the new style guns are now in production use. The tube specification has been revised to MIL-E-1E standards. The production engineering program is now in full operation with daily tube manufacture, exhaust, testing, analysis of rejects and resultant engineering tests to improve the tube yield. (Author)

**AD-622 879 Div. 8/2**
**CFSTI Prices: HC $4.00 MF $0.75**
*TRW SEMICONDUCTORS INC LAWNDALE CALIF RESEARCH AND DEVELOPMENT DEPT*
**TRANSISTOR, VHF, SILICON, POWER (10W-500MC).**
Final rept. for 1 Jul 63-15 Jan 65,
by R. N. Clarke, and J. Crishal. 15 Jan 65, 120p. Rept. no. 59-RD-F
Contract DA36 039AMC03189E Proj. 1P6 22001A056 Task 1P6 22001A056 01
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale. See also AD-439 230.

Descriptors: (*Transistors, Silicon), Very high frequency, Radiofrequency power, Crystals, Processing, Packaging, Chemical milling, Diffusion, Silicone plastics, Vapor plating, Metal films

The transistor produces 10 watts at 500 mc with 5-6 db of power gain and 30-40% collector efficiency. The crystal was originally designed according to present power gain theory, but it only had one to two db of power gain at 500 mc. The second crystal design was based upon the smallest practical pattern dimensions, or a 0.1 mil minimum spacing. The redesigned pattern also had provision for analyzing the transistor in multiples of sub cells as well as in its entirety. Such an analysis showed the necessity of symmetry of base feed in common emitter amplifiers to get all the cells working together. Paralleling of cells also indicated an apparent loss in f sub T with increased size. Processing and assembly was generally along standard industry practice except in the area of photoresist. There, improved glass masks were used, along with the new KTFR photoresist. Successful etching of fine metallized patterns was accomplished

through the development of a jet etching technique. To retain as much of the innate crystal performance capability as possible, considerable work was done on packaging. It was concluded that no available package was truly adequate. The best available for the R.F. performance is the silicone molded package due to its short, low-loss leads. This package has a bonus of reliability and ruggedness as well as a large cost reduction in eventual production. (Author)

**AD-622 896 Div. 8/4**
*STANFORD RESEARCH INST MENLO PARK CALIF APPLIED PHYSICS LAB*
**STABLE, DISTRIBUTED-DYNODE ELECTRON MULTIPLIER,**
by C. A. Spindt, and K. R. Shoulders. 25 Sep 64, 5p. Contract Nonr344900
Unclassified report

Pub. in The Review of Scientific Instruments v36 n6 p775-9 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electron multipliers, Distilled amplifiers), Stability, Gain, Vapor plating, Secondary emission

The development of a high gain, stable electron multiplier is described. The configuration investigated consists of two rectangular, continuous dynodes forming a plane-parallel channel. Details of strip preparation, film deposition, and experimental performance values are discussed. (Author)

**AD-622 928 Div. 8/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMOUR RESEARCH FOUNDATION CHICAGO ILL*
**EVALUATION OF SILICON METALLIC RECTIFIERS.**
Interim engineering rept. no. 9, 1 Jul-30 Sep 60, by B. F. Lathan. 1 Oct 60, 29p. Contract NObs72444 Proj. S F013 12 09 ,ARF E107
Unclassified report

See also AD-622 929.

Descriptors: (*Rectifiers, Silicon), (*Silicon, Rectifiers), Environmental tests, Life expectancy, Temperature, Diodes (Semiconductors), Crystal rectifiers

Silicon rectifiers offer many advantages over rectifiers made of other materials, therefore, the use of these devices is widespread, particularly in military equipment applications. This project is designed to yield information to specify rectifier service life as a function of the ambient operating temperature for a medium-power class of diodes characterized by 1N540 diodes. To this end, three groups of rectifiers have been placed on life test at different ambient temperatures to determine three points on a curve of life versus ambient temperature. An accumulated test time of over 4,392 hours has been represented by data gathered on the 200C environmental group. To date, a total of 34 failures have occurred, and 11 diodes have survived the life test on this group. The 185C and 170C environmental groups were placed under life tests during the last period. At the end of 504 hours, 15 failures had occurred for the 185C test group and five failures for the 170C test group. (Author)

**AD-622 929 Div. 8/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMOUR RESEARCH FOUNDATION CHICAGO ILL*
**EVALUATION OF SILICON METALLIC RECTIFIERS.**
Interim Engineering rept. no. 10, 1 Oct-30 Dec 60, by B. F. Lathan. 1 Jan 61, 27p. Contract NObs72444 Proj. S F013 12 09 ,ARF E107
Unclassified report

See also AD-276 987.

Descriptors: (*Rectifiers, Silicon), (*Silicon, Rectifiers), Environmental tests, Life expectancy, Temperature, Diodes (Semiconductors), Crystal rectifiers

Silicon rectifiers offer many advantages over rectifiers made of other materials, therefore, the use of these devices is widespread, particularly in military equipment applications. This project is designed to yield information to specify rectifier service life as a function of the ambient operating temperature for a medium-power class of diodes characterized by 1N540 diodes. To this end, three groups of rectifiers have been placed on life test at different ambient temperatures to determine three points on a curve of life versus ambient temperature. An accumulated test time of over 6500 hours has been represented by data gathered on the 200 C environmental group. To date, a total of 35 failures have occurred, and 10 diodes have survived the life test on this group. The 185 C and 170 C environmental groups have been subjected to over 3000 hours of experiment. At the end of 2952 hours, 30 failures had occurred for the 185 C test group and seven failures for the 170 C test group. Diodes from Manufacturer '6' continue to exhibit a markedly low rate of failure at the elevated temperatures of 200 C and 185 C. (Author)

**AD-622 963 Div. 8/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*MICTRON INC ALBANY N Y*
**C.W. X-BAND VOLTAGE TUNABLE OSCILLATOR.**
Quarterly progress rept. no. 8, 1 Apr-30 Jun 65, by M. R. Boyd, and M. Weinstein. 30 Jun 65, 20p. Contract DA36 039AMC03270E Proj. 1P6 22001A055 04
Unclassified report

See also AD-617 396.

Descriptors: (*Microwave oscillators, X band), (*Magnetrons, X band), Electron tubes, Performance (Engineering), Voltage, Radiofrequency power, Tuning circuits, Packaging

Tubes of the Design I approach were modified in accordance with experimental evidence that indicated that the major electronic interaction took place near the vane tips. Wide band performance at good power and efficiency has been achieved with these tubes. Increased control electrode voltage range, reduced emitter back heating and consistent performance are the areas to be refined. (Author)

**AD-622 982 Div. 8/2 ,26/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*TEXAS INSTRUMENTS INC DALLAS*
**PRODUCTION ENGINEERING MEASURES (PEM) FOR A GERMANIUM MICROWAVE TRANSISTOR.**
Quarterly progress rept. no. 4, 31 Mar-30 Jun 65. 30 Jun 65, 35p. Rept. no. TI-03-65-76
Contract DA36 039AMC03632E Proj. 74057
Unclassified report

See also AD-617 564.

Descriptors: (*Transistors, Manufacturing methods), (*Microwave equipment, Transistors), (*Germanium, Transistors), Noise (Radio), Gain, Ultrahigh frequency, Performance (Engineering), Design, Packaging, Electrical properties

The measured value of 1.5 Gc and 3.0 Gc noise figure of the common-emitter mounted L-78B device, after correction for the second stage noise contribution, is 3.4 db and 4.9 db respectively. All other measured parameters of the L-78B device meet the tentative electrical specifications. The newest pattern, the L-148, designed specifically to yield a device with greater power gain capability, met all of the device parameter specifications. Typical values of the common-emitter insertion gain of the L-148 device at 1.5 Gc and 3.0 Gc and 8.5 db and 5.2 db respectively. The corrected value of noise figure at 1.5 Gc and 3.0 Gc is 3.7 db and 5.5 db respectively. The electrical characteristics of the L-148 device are consistent with the design modification and represent an improvement in device performance over the L-78B, especially in the area of power gain capabilities. However, since only a limited amount of devices have been obtained using the L-148 pattern, the repeatability of the process remains to be established. Until the repeatability is determined, the L-148 process is considered to be in an optimization stage. The TI-Line package has been modified by increasing the diameter of the welding flange to afford greater welding area. The modification was necessary in order to prevent the package from becoming non-hermetic after the soldering heat test. (Author)

**AD-622 984 Div. 8/2 ,26/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*ERIE TECHNOLOGICAL PRODUCTS INC PA*
**PRODUCTION ENGINEERING MEASURE FOR RESISTOR-CAPACITOR MICROELEMENTS FOR MICROMODULES.**
Quarterly rept. no. 8, 27 Mar-25 Jun 65, by J. E. Schupp. 25 Jun 65, 14p. Contract DA36 039AMC01479E
Unclassified report

See also AD-615 826.

Descriptors: (*Modules (Electronics), Microminiaturization (Electronics)), (*Capacitors, Microminiaturization (Electronics)), (*Resistors, Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Modules (Electronics)), Manufacturing methods, Life expectancy, Performance (Engineering)

Progress is reported to establish capability to manufacture Resistor-Capacitor Combination Microelements for Micromodules, including actual fabrication and testing of preproduction samples, and accomplishment of production type run to demonstrate mass production techniques and facilities. (Author)

**AD-623 016 Div. 8/2 ,7/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**PULSED NUCLEAR RADIATION INDUCED TRANSIENTS IN ELECTRICAL CABLES (DRF NO. 1).**
Technical rept.,
by William Schlosser, Joseph Newberg, and Joseph A. Key. Jul 64, 40p. Rept. no. ECOM-2415
Proj. 1C0 24401A112 Task 1C0 24401A11205,DASA5900 21 830 23 00
Unclassified report

See also AD-400 145, AD-406 623.

Descriptors: (*Radiation damage, Coaxial cables), (*Coaxial cables, Radiation damage), (*Transients, Coaxial cables), Electric cables, Pulse reactors, Neutrons, Gamma rays

The pulse nuclear radiation induced transients in the individual conductors of RG-62A/U and RG-59B/U coaxial cables and a multiconductor ribbon cable due to exposure to the DRF-Mark F TRIGA reactor were studied as a function of applied voltage and repetitive exposure. The cable response consists of three current constituents: a replacement current, a conduction current, and a charging current. The predominance of the replacement component over the conduction component of the observed current after repetitive exposure was noted. The charging current is attributed to the introduction of charges in an initial exposure and to the redistribution of charges in an exposure

accompanying an applied voltage change. The magnitudes of the induced currents were considerably lower than those observed for these cables at SPRF. An RF signal transmitted through an RG-62A/U cable was attenuated by an amount that was also considerably lower than the attenuation observed at SPRF. (Author)

**AD-623 026 Div. 8/2 ,4/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*NEW YORK UNIV N Y DEPT OF CHEMISTRY*
**TWO REMARKS ON THE RESISTIVE CONTRIBUTION TO OVER-POTENTIAL.**
Technical progress rept.,
by Benson R. Sundheim. 15 Oct 65, 13p. Contract Nonr28537

Unclassified report

Descriptors: (*Voltage, Electrodes), (*Electrodes, Voltage), Resistance (Electrical), Electric currents, Microminiaturization (Electronics), Electrochemistry, Capillary tubes

The placement of reference electrodes to minimize the contribution of the iR drop to the apparent overpotential of the electrode being studied is discussed. The resistive contribution to the overpotential is determined.

**AD-623 032 Div. 8/2**
*ARMY ELECTRONICS LABS FORT MONMOUTH N J*
**CONTINUOUSLY VARIABLE DELAY LINE FOR FREQUENCIES BELOW 100 MC,**
by H. Brueckmann, and D. V. Campbell. 1965, 2p

Unclassified report

Pub. in Electronics np May 31 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Delay lines, Electrical properties), Dielectrics, Ferrites, Ceramic materials, Phase control devices, High frequency, Very high frequency

**AD-623 035 Div. 8/2**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J ELECTRONIC COMPONENTS LAB*
**IMPROVEMENTS IN HF AND VHF QUARTZ FILTER CRYSTALS.**
Revised ed.,
by R. Bechmann, T. J. Lukaszek, and H. Wasshausen. 16 Jun 65, 1p.

Unclassified report

Pub. in Proceedings of IEEE v53 n8 p1160-1 Aug 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 2 Jun 65.

Descriptors: (*Crystal filters, Quartz), (*Quartz, Crystal filters), High frequency, Very high frequency, Radiofrequency filters, Manufacturing methods, Design

Investigations have recently been conducted incorporating the electrode thickness as a new parameter, in an effort to obtain improved filter crystals at high frequencies. The experiments were performed on fundamental-, third-, and fifth-overtone crystals with various electrode thicknesses operating in the frequency range 4 to 112 Mc/s, and resulted in filter crystals having a superior performance.

**AD-623 037 Div. 8/2**
*ARMY ELECTRONICS LABS FORT MONMOUTH N J SOLID STATE AND FREQUENCY CONTROL DIV*
**AN EXPLANATION OF THE 'ENERGY' DEPENDENCE OF SECONDARY BREAKDOWN IN TRANSISTORS.**
Revised ed.,
by B. Reich, and E. B. Hakim. 15 Feb 65, 2p.

Unclassified report

Pub. in Proceedings of the IEEE, v53 n6 p624-5 Jun 1965. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Transistors, Electric discharges), (*Electric discharges, Transistors), Energy, Voltage, Thermal properties

**AD-623 053 Div. 8/2 ,15/1**
*RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE*
**SOME MAPPING PROPERTIES OF RC AND RL DRIVING-POINT IMPEDANCE FUNCTIONS,**
by Thomas S. Huang. 18 Aug 64, 3p. Contract DA36 039AMC03200E Grant ,NSF GP2495

Unclassified report

Pub. in I E E E Transactions on Circuit Theory, vCT124) n2 p257-9 Jun 1965. (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electrical impedance, Functions), (*Conformal mapping, Functions), Circuits, Resistance (Electrical), Capacitance, Inductance, Complex variables

It is shown that RC or RL driving-point impedance function Z (s) maps the closed right-half s plane onto a region in the Z plane which is covered by the closed circular disk with the straight line segment joining Z (o) and Z (N) as a diameter (N approaches infinity); and which covers the open circular disk with center at Z (u) and radius = 1/2 u Z' (u), and the straight line segment Z=Z (u) + jtu Z' (u), -1<t<1, for any real positive number u. (Author)

**AD-623 067 Div. 8/2 ,15/1**
*RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE*
**SYNTHESIS OF A CLASS OF NON-LINEAR SYSTEMS,**
by Martin Schetzen. 10 Nov 64, 14p. Contract DA36 039AMC03200E Grant ,NSF GP2495

Unclassified report

Pub. in International Journal of Control v1 n5 p401-13 May 1965 (Copies available only to DDC users).

Descriptors: (*Input-output devices, Synthesis), Nonlinear systems, Control systems, Functional analysis, Integral transforms, Series, Integrals

A problem in the practical application of the Volterra series to non-linear theory is the synthesis of systems with a given set of Volterra kernels. In this article a method is presented of determining whether a given Volterra kernel can be synthesized exactly by using only a finite number of multipliers. A method for the synthesis of such kernels is also presented. The use of the techniques discussed here is illustrated by examples. (Author)

**AD-622 309** **See Fld. 20/12**

**AD-622 367** **See Fld. 13/9**

**AD-622 492** **See Fld. 9/2**

**AD-622 610** **See Fld. 17/2**

**AD-622 819** **See Fld. 9/2**

**AD-623 078** **See Fld. 18/8**

## 9/2. COMPUTERS

**AD-622 366 Div. 30/2 ,28/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVY ELECTRONICS LAB SAN DIEGO CALIF*
**OPERATOR PERFORMANCE ON MINIATURIZED DECIMAL-ENTRY KEYSETS.**
Research rept. for 1 Jun-15 Sep 61,
by L. E. Hufford, and R. Coburn. 4 Dec 61, 18p.
Rept. no. NEL-1083
Proj. S R006 90 02 Task 5742

Unclassified report

Descriptors: (*Miniature electronic equipment, Operators (Personnel)), (*Human engineering, Miniature electronic equipment), Performance tests, Design, Operation, Errors, Performance (Human), Digital systems, Recording systems

Two different miniature keyset designs were instrumented for the entry of decimal numbers. One of these, designed for probe actuation, could be operated either with a probe attached to the index finger or with a pencil-like probe. The other was designed for touch operation using only the index finger. An experiment was conducted to compare the three methods of operating miniature keysets with operation of a standard-size keyset. There was no significant difference in performance between either of the probe-operated keysets and the standard keyset, but the 'touch' miniature keyset showed a significantly more errors than the standard set. It was concluded that, where space conservation is important, a miniature probe-actuated keyset may be employed without penalty in time or error rate. (Author)

**AD-622 368 Div. 30/2 ,28/3**
**CFSTI Prices: HC $3.00 MF $0.75**
*NAVY ELECTRONICS LAB SAN DIEGO CALIF*
**HUMAN FACTORS IN KEYSET DESIGN.**
Research rept. for Oct 59-Sep 60,
by W. A. Hillix, and R. Coburn. 22 Mar 61, 59p.
Rept. no. NEL-1023
Proj. S R006 09 02 Task 5742

Unclassified report

Descriptors: (*Computer operators, Performance (Human)), (*Input-output devices, Human engineering), (*Human engineering, Input-output devices), Digital computers, Real time, Tough, Operators (Personnel), Numbers, Design, Performance tests, Errors, Corrections, Models (Simulations)

A block diagram of the keyset entry process is proposed and discussed. The application of the block diagram to two different types of keyset entry process is shown. Empirical observations and research show that no one feature of the keyset entry process determines the rate at which the keyset can be used to transmit information, and that the single most important determiner of entry rate is probably the type of entry process possible with the keyset. If the entry process is continuous, so that component activities overlap, entry will be faster than in circumstances where the component activities must occur serially. (Author)

**AD-622 387 Div. 30/2 ,32/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**CAN A MACHINE CREATE A DESIGN,**
by Yu. Sinyakov. 23 Sep 65, 7p. Rept. no. FTD-TT-65-1150
TT , 65-64164

Unclassified report

Unedited rough draft trans. of Pravda, Moscow (USSR) 5 Jul 1962 p2.

Descriptors: (*Computers, Design), (*Design, Computers), (*Civil engineering, Computers), Buildings, Structural properties, USSR



704-372 O-65 4

The use of computers for assistance in making architectural designs is related. Andrey Savchenko of the Moscow Architectural Institute is credited with using cybernetics in calculating the strength of structural slabs for roofs and for covering a winter stadium. The machine is said to be able to create design: by 'reading' an architectural sketch into a computer, an image of all possible combinations of architectural forms is attained from which a selection may be made.

**AD-622 413 Div. 30/2 ,15/2**
**CFSTI Prices: HC $3.00 MF $0.75**
*LOWELL TECHNOLOGICAL INST RESEARCH FOUNDATION MASS*
**FOURIER ANALYSIS COMPUTER PROGRAM.**
Scientific rept. no. 1, 1 Jun 64-1 Jun 65,
by Walter G. Hartung. May 65, 61p. Contract AF19 628 1696 Proj. 7637 Task 763703
AFCRL , 65-552

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Fourier analysis, Programming (Computers)), (*Programming (Computers). Fourier analysis), Programming languages

This report discusses an IBM 7090-7094 computer program written in FORTRAN to analyze the period components of a time series function and compute the integrated power of these components by Fourier techniques. The theoretical considerations of Fourier analysis are presented in sufficient detail for an understanding of the computer program developed. Also described is the operation and use of the program. An example is presented which summarizes and illustrates the computer program. (Author)

**AD-622 462 Div. 30/2 ,26/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**AUTOMATION OF PLANNING-CONSTRUCTION OPERATIONS WITH THE AID OF DIGITAL ELECTRONIC COMPUTERS,**
by G. K. Goranskii. 20 Sep 65, 21p. Rept. no. FTD-TT-65-1149
TT , 65-64187

Unclassified report

Unedited rough draft trans. of Mekhanizatsiya i Avtomatizatsiya Proizvodstva (USSR) v16 n6 p45-50 1962.

Descriptors: (*Automation, Digital computers), Machines, Programming (Computers), Mathematical models, Processing, Manufacturing methods, Optimization, Machine tool industry, USSR

**AD-622 485 Div. 30/2 ,2/2 ,2/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**DESCRIPTION OF AN/UYK PROGRAM FOR POINTING DATA FOR 60-FOOT DISH USING KEPLER ELEMENTS,**
by Larry L. Warnke. 5 Mar 64, 48p. Rept. no. CF-3074
Contract NOw62 0604c

Unclassified report

Descriptors: (*Programming (Computers), Tracking), (*Tracking, Radio astronomy), Orbital trajectories, Celestial mechanics, Satellites (Artificial), Antennas

The AN/UYK Program for pointing data for the 60-foot dish using Kepler elements is utilized for generating a paper tape with the proper format which can be fed into the equipment controlling the 60 foot dish antenna and point it in the proper direction at the desired time. This program would be used when the data is not available from the 7090 complex for the operation of the injection station. It could also be used to track a satellite, whose orbit is defined by Kepler parameters, which is not within the normal operational scope of the injection station.

**AD-622 492 Div. 30/2 ,8/2**
**CFSTI Prices: HC $3.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**AN EVALUATION OF THE 'NEURON' DEVICE,**
by G. J. Veth. 13 Dec 63, 53p. Rept. no. CF-3058
Contract NOw62 0604c

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*omputer logic, Transistors), (*Transistors, Computer logic), Semiconductor devices, Gates (Circuits), Relaxation oscillators, Molecular electronics, Circuits

The 'Neuron' is a semiconductor device designed and manufactured by Crystalonics, Inc., of Cambridge, Massachusetts, to perform a multiple of boolean logic functions. The proposed boolean logic capabilities of the 'Neuron' device in its present state of development are investigated for application in typical digital systems.

**AD-622 520 Div. 30/2 ,24/2**
**CFSTI Prices: HC $4.00 MF $1.00**
*STANFORD RESEARCH INST MENLO PARK CALIF*
**RESEARCH ON COMPUTER-AUGMENTED INFORMATION MANAGEMENT.**
Final rept.,
by D. C. Engelbart, and Bonnie Huddart. Mar 65, 132p. Contract AF19 628 4088 Proj. SR14987
ESD , TDR-65-168

Unclassified report

See also AD-432 098.

Descriptors: (*Programming (Computers), Design), (*Photographic techniques, Computers), (*Management engineering, Computers), Data processing system, Data storage systems, Instruction manuals, Documentation, Reports, Automation, Printing, Photographic techniques

This report presents results of a research and experimental project in computer-augmented information management. The report is, in itself a product of the project: With the exception of 'front matter,' the entire report was composed, edited, and produced with on-line and off-line computer aids. For this project, the techniques of computer aids were applied to two areas: task monitoring and program design. The processes and techniques developed offer a promising beginning to computer-aided programming design extending from initial specification to final debugging in a unified design record that grows and evolves to complete final documentation. The processes and techniques also offer promise in increasing the productivity of individuals and groups of programmers. Future work envisioned for information-management systems such as that used in this study include program design records, external reference documentation, and user reference manuals. As an appendix, there is attached 'User's Guide: Man-Machine Information System,' revised June 1965. (Author)

**AD-622 551 Div. 30/2 ,25/3 ,25/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*LFE ELECTRONICS BOSTON MASS SOLID STATE ELECTRONICS LAB*
**ELECTRO-OPTICAL MATRIX DISPLAY.**
Quarterly interim development rept. no. 4, 18 Jun-18 Sep 65, 16p. Rept. no. 480-Q4
Contract NOBsr91199

Unclassified report

See also AD-613 721.

Descriptors: (*Thin films (Storage devices), Display systems), (*Magneto-optic effect, Thin films (Storage devices)), (*Computer storage devices, Thin films (Storage devices)), Ferromagnetic materials, Powder metals, Nickel, Iron, Colloids, Protective treatments, Silicon coatings, Manufacturing methods

Preparation of RIS 1 films with low coercive force and good display properties is readily achieved, and continued efforts have been made toward further improvement of display element properties and reproducibility. The problem of immobilization of the bitter colloid in an unswitchable display pattern has been investigated by modifying the preparation of colloid dispersions, and by providing protective overlayers on the magnetic films. Recent non-aqueous suspensions in glycerine appear to be a solution to immobilization; other aqueous suspensions also show promising freedom from immobility over long periods. Protective coatings consisting of 3 layers of SiO of 800 A, total thickness, appear effective in protecting films against corrosion and immobilization. Continued refinement of seals, spacers, and filling techniques is in progress, although workable sealed modules can be readily made at the present state of development. (Author)

**AD-622 671 Div. 30/2**
*SASKATCHEWAN UNIV SASKATOON*
**A SMALL TRANSISTORIZED DIGITAL COMPUTER: ARITHMETIC AND CONTROL SECTIONS.**
Reprint,
by A. D. Booth, and K. Cameron. 1965, 7p.
Contract NRC BT140 ,DRB2804 05

Unclassified report

(Copies available only to DDC users).

Descriptors: (*Digital computers, Computer logic), Computer storage devices, Transistors, Gates (Circuits), Computer storage devices, Circuits, Control

The logic and circuits for the control and arithmetic sections of a new small sized all-purpose digital computer are described. The machine uses magnetic drum storage for 8192 words each having 32 bits and operates at a digit frequency of 150kc/s. (Author)

**AD-622 675 Div. 30/2 ,15/1**
*CALIFORNIA UNIV LOS ANGELES WESTERN MANAGEMENT SCIENCE INST*
**A PROBLEM IN PATTERN RECOGNITION.**
Revised ed.,
by Zivia S. Wurtele. 5 Oct 64, 11p. Rept. no. wmsi reprint no. 27
Proj. NR047 041

Unclassified report

Pub. in Journal of the Society for Industrial and Applied Mathematics v13 n1 p60-67 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 13 Jul 64.

Descriptors: (*Pattern recognition, Mathematical logic), Vector analysis, Set theory, Probability, Sequences, Artificial intelligence

This paper establishes an algorithm for a machine learning problem, often referred to as a pattern recognition problem. Independent observations are made simultaneously on members of each of two categories, the problem being to learn to recognize these categories under fairly severe memory restrictions. It is assumed that the space of the attribute or observation vectors of the individuals to be classified is a finite dimensional Euclidean space, and that the two classes of attribute vectors are strictly separable by a hyperplane. When the

artificial intelligence is presented with a pair of vectors, it is informed of the categories to which these vectors belong, and it then estimates a separating hyperplane; its current estimate of a separating hyperplane is all it stores in memory. Conditions for the convergence of this estimate to a hyperplane which correctly separates the regions are derived. This algorithm is not unique; in fact, another algorithm for solving this problem is given in Albert. This type of learning problem may be solved by any of a large class of algorithms which differ in their convergence rates, complexity of computation and amount of memory. One should expect investigations of convergence properties of individual algorithms for solving a variety of similar learning problems to appear in the literature before much progress is made in the development of a general theory for characterizing algorithms and selecting a 'best' algorithm from a class of algorithms. It is hoped that the relatively simple convergence proof for the algorithm of this paper will provide some insight into the more general problem.

**AD-622 676 Div. 30/2 ,18/3 ,26/2**
**CFSTI Prices: HC $3.00 MF $0.75**
*OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING WASHINGTON D C*
**SURVEY OF STUDIES AND COMPUTER PROGRAMMING EFFORTS FOR RELIABILITY, MAINTAINABILITY, SYSTEM EFFECTIVENESS.**
Sep 65, 69p. Rept. no. OEM-1
Unclassified report

Descriptors: (*Armed forces supplies, Programming (Computers)), (*Programming (Computers), Armed forces supplies), Reliability, Maintenance, Systems engineering, Effectiveness, Circuits, Simulation

Survey of efforts under way or recently completed for computer programming or techniques that are adaptable to computer operations in the areas of system analysis for reliability, maintainability, availability, system effectiveness, cost-effectiveness, system simulation, circuit analysis, and failure mode and effects analysis. (Author)

**AD-622 744 Div. 30/2**
**CFSTI Prices: HC $3.00 MF $0.75**
*RAND CORP SANTA MONICA CALIF*
**EVENT-CHAIN FLOW CHARTING IN AUTOSATE: A NEW VERSION,**
by D. D. Butler, and O. T. Gatto. Oct 65, 75p.
Rept. no. RM-4729-PR
Contract AF49 638 66C0001
Unclassified report

Descriptors: (*Data processing systems, Analysis), Design, Control, Computer, Indexes, Reports, Programming (Computers), Punched cards

Event-chaining is the process of automatically preparing flow charts of an information network by linking document flows between stations in the network. Each station is a data-processing activity that reacts to documents processed at it when various events occur. The linking of events associated with related documents produces event-chain flow charts. Each link in the flow chart represents an action that is taken against or an event that affects a particular document. The over-all system connected with generating the new version of event-chains, and its relation to the old system (AD-430 136), are described in Sec. I. The system has three phases: documenting system data flows, translating inputs into machine-readable form, and producing event-chain flow charts by computer. System outputs and processing options are discussed in Sec. II. Four options are available with the event-chaining phase. Option 1 prepares the event-chain flow-chart report once the main program generates the event-chain links. Option 2 produces an index and compilation of forms by chain number. Option 3 is a diagnostic tool that detects missing transactions (nonexistent sequence numbers) and identifies them by the chain in which they belong. Option 4 permits the user to print selected records in order to assess their impact upon the data system.

**AD-622 764 Div. 30/2 ,15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**A SIMPLE PROOF OF A THEOREM ON SELFSYNCHRONIZING AUTOMATA,**
by Dale M. Landi. Oct 65, 6p. Rept. no. P-3242
Unclassified report

Descriptors: (*Theorems, Automata), (*Automata, Theorems), Mathematical logic, Probability, Synchronization (Electronics)

A short proof is offered for verifying that a finite state, completely specified automaton is synchronized with probability 1 only if there exists a universal synchronizer for the automaton. (Author)

**AD-622 788 Div. 30/2**
**CFSTI Prices: HC $3.00 MF $0.75**
*AEROSPACE TECHNOLOGY DIV LIBRARY OF CONGRESS WASHINGTON D C*
**COMPUTER TECHNOLOGY: COMPILATION OF ABSTRACTS.**
Rept. no. 2,
by Joseph Podoski, and Stuart Hibben. 13 Oct 65, 64p. Rept. no. ATD-P-65-64
TT , 65-64250
Unclassified report

Rept. on Surveys of Soviet Scientific and Technical Literature. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Computers, USSR), Automation, Cybernetics, Electronic equipment, Electrical equipment, Inputoutput devices, Analog computers, Digital computers, Electrical engineering, Reviews, Abstracting

Abstracts contained in the report were selected from Soviet open-source literature published during the first six months of 1965 and available at the Aerospace Technology Division and the Library of Congress. Information not directly related to the assigned subject has been included because of its broad implications for study in this field. The 43 abstracts are arranged alphabetically by author within each of the following categories: components, design, applications, and associated systems. The appendix contains 33 brief abstracts from the Soviet patent journal Byulleten' izobreteniy i tovarnykh znakov. A bibliography is presented at the end of the report. (Author)

**AD-622 819 Div. 30/2 ,8/2**
**CFSTI Prices: HC $6.00 MF $1.25**
*INTERNATIONAL BUSINESS MACHINES CORP POUGHKEEPSIE N Y*
**CRYOGENICS MEMORY PLANE INTERCONNECTION TECHNIQUES.**
Final rept. for May 64-May 65,
by J. Rosenberger, A. B. Lindquist, and R. R. Seeber. Oct 65, 208p. Contract AF30 602 3344
Proj. 5581 Task 558108
RADC , TR-65-149
Unclassified report

Descriptors: (*Cryogenic storage devices, Electric connectors), (*Electric connectors, Cryogenic storage devices), Computer logic, Coupling circuits, Superconductors, Vapor plating, Inductance, Switching circuits

Several factors which are key to the success of a Cryotron Associative Processor (CAP) were studied in detail. CAP control circuits and several types of comparator cells were built and tested. Intraplanar coupling techniques were evaluated and a low inductance method was successfully demonstrated. Ladder circuit resolution times were theoretically analyzed and the analysis confirmed experimentally. A three-plane model was built with partial success. A tester was build with a two-fold purpose: a. To exercise the model in an associative manner. b. To evaluate the adequacy of the system design resulting from the use of the simple comparator cell. (Author)

**AD-622 988 Div. 30/2 ,16/15**
**CFSTI Prices: HC $4.00 MF $1.00**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**SOUND RECOGNITION IN A NEURAL NETWORK.**
Master's thesis,
by Leon Dale Minard,Jr.. Aug 65, 127p. Rept. no. GE/EE/65-15
Unclassified report

Descriptors: (*Pattern recognition, Sound signals), (*Auditory nerve, Simulation), (*Electrical networks, Auditory nerve), (*Bionics, Speech recognition), Ear, Analog systems, Learning, Computer logic, Nervous system, Hearing, Programming (Computers), Matrix algebra

The sound patterns for eight sustained phonemes are used as input to a single-level network of eight Steele neuromimes. Each pattern is a loudness (neuron firing rate) versus frequency representation of the output from the cochlear section of an electrical analog of the ear. Recognition of a pattern occurs when one of the eight outputs of the network, as designated, becomes greater than all the rest. To meet the requirement for recognition, the learning process involves a matrix transformation that allows the elements of the matrix to change. The transformation used was 20, the dimensionality of each pattern, to 8, the dimensionality of the network output. The network, after careful selection of network parameters, achieved continuous recognition for three consecutive cycles of the eight patterns. (Author)

**AD-623 001 Div. 30/2 ,15/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*MICHIGAN UNIV ANN ARBOR COMMUNICATION SCIENCES PROGRAM*
**TAPE MACHINE REALIZATIONS OF COMMUTATIVEREGULAR EVENTS.**
Technical rept.,
by Richard Laing. Sep 65, 75p. Rept. no. 07363, 03105-39-T
Contract Nonr122421 Grant ,DA ARO D31 124G665 Proj. ORA03105 ,ORA073363
Unclassified report

Descriptors: (*Computer storage devices, Theory), (*Automata, Combinatorial analysis), (*Combinatorial analysis, Automata), Magnetic tape, Matrix algebra, Algebraic topology

Infinite tape machine realizations of classes of commutative-regular events are explored. In particular, a class of events which requires for machine realization an infinite-state machine with an infinite nuber of final states, and a class, somewhat more intractable, which requires an infinite state machine with an infinite number of final states, and which in addition is not strongly connected, are considered. Procedures for constructing deterministic machines with infinite counter tapes, which realize the events under examination are given. (Author)

**AD-622 301 See Fld. 4/2**

**AD-622 339 See Fld. 5/10**

**AD-622 481 See Fld. 22**

**AD-622 489 See Fld. 9/4**

AD-622 494 See Fld. 22

AD-622 570 See Fld. 5/7

AD-622 635 See Fld. 5/1

AD-622 666 See Fld. 17/9

AD-622 697 See Fld. 9/1

AD-622 712 See Fld. 4/2

AD-622 833 See Fld. 8/6

AD-622 985 See Fld. 3/1

AD-623 008 See Fld. 5/9

AD-623 068 See Fld. 12/1

## 9/3. ELECTRONIC AND ELECTRICAL ENGINEERNG

**AD-622 561 Div. 8/3 ,25/2 ,26/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*KNIGHT'S (JAMES) CO SANDWICH ILL*
**VHF QUARTZ CRYSTAL UNITS CR- (XM-38)/U 150 MC TO 200 MC.**
Quarterly rept. no. 6, 1 Jul-31 Sep 64.
31 Sep 64, 31p. Contract DA36 039sc85973
Unclassified report

Rept. on Production Engineering Measures.

Descriptors: (*Crystal oscillators, Quartz), (*Quartz, Crystal oscillators), Very high frequency, Ultrahigh frequency, Gold, Aluminum, Plating, Capacitance, Inductance, Resistance (Electrical), Crystal holders, Specifications, Manufacturing methods, Tables

The parameters of preproduction samples of the overtone units, 150 mc, 162 mc, 174 mc, 188 mc, and 200 mc are given, and adjusting ultra-high frequency units to frequency with evaporated gold is discussed. (Author)

AD-622 330 See Fld. 9/1

AD-622 346 See Fld. 9/1

AD-622 467 See Fld. 6/12

AD-622 574 See Fld. 9/1

AD-622 829 See Fld. 9/4

AD-622 864 See Fld. 17/7

AD-622 950 See Fld. 20/14

AD-623 016 See Fld. 9/1

AD-623 082 See Fld. 20/14

## 9/4. INFORMATION THEORY

**AD-622 320 Div. 8/7 ,6/6**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**BOUNDS ON THE VOLUME AND HEIGHT DISTRIBUTIONS OF THE AMBIGUITY FUNCTION.**
Revised ed.,
by R. Price, and E. M. Hofstetter. 23 Nov 64, 8p.
Unclassified report

Pub. in IEEE Transactions on Information Theory VIT-11 n2 p207-14 Apr 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 31 Aug 64.

Descriptors: (*Radar pulses, Statistical functions), Communication theory, Radar signals, Wave transmission, Volume, Integral transforms

Augmenting Woodward's total-volume invariance, new information on ambiguity-function behavior is obtained and illustrated by example. The results are of two types, the first dealing with the time-frequency volume distribution and providing lower bounds to local volume, and upper bounds to attainable 'clear area'; these follow from Parseval's theorem as applied to Siebert's self-transform property. The second category of necessary conditions consists of a set of upper bounds on the norms of the ambiguity function, which places restrictions on the height distribution of the ambiguity surface. As a corollary, it is demonstrated that not all non-negative functions that are self-transformable can be ambiguity functions. (Author)

**AD-622 321 Div. 8/7 ,25/1 ,5/5 ,5/2**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**TECHNIQUES FOR SPEECH BANDWIDTH COMPRESSION, USING COMBINATIONS OF CHANNEL VOCODERS AND FORMANT VOCODERS,**
by Bernard Gold. 1 Apr 65, 9p.
Unclassified report

Pub. in Journal of the Acoustical Society of America v38 n1 p2-10 Jul 1965 (Copies not available to DDC or Clearinghouse customers). Supported by the Air Force

Descriptors: (*Speech compression, Instrumentation), (*Voice communication systems, Speech compression), (*Coding, Speech compression), (*Communication theory, Speech compression), Bandwidth, Speech transmission, Communication equipment

Both channel vocoders and formant vocoders have often been used as bandwidth-compression devices. This paper explores several configurations wherein elements of both are combined into a single system. Frameworks are proposed within which the element forms can be systematically changed. Experimental results from several specific cases are discussed. Most significant of these is the comparison between an 11-parameter system presented in this paper and a 16-channel laboratory vocoder. The quality obtained from the two systems was comparable, indicating that data-rate savings are possible with the new configurations. (Author)

**AD-622 410 Div. 8/7 ,6/6 ,15/2**
**CFSTI Prices: HC $3.00 MF $0.75**
*RAND CORP SANTA MONICA CALIF*
**TOPICS IN GENERALIZED LEAST SQUARES SIGNAL ESTIMATION,**
by P. Swerling. Sep 65, 71p. Rept. no. P-3007-1
Unclassified report

Descriptors: (*Least squares method, Signals), (*Signals, Least squares method), Communication theory, Stochastic processes, Signal-to-noise ratio, Radar signals

**AD-622 411 Div. 8/7**
**CFSTI Prices: HC $2.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**CLASSES OF SIGNAL PROCESSING PROCEDURES SUGGESTED BY EXACT MINIMUM MEAN SQUARE ERROR PROCEDURES,**
by P. Swerling. Sep 65, 50p. Rept. no. P-3029-1
Unclassified report

Descriptors: (*Signals, Processing), (*Least squares method, Communication theory), Signal-to-noise ratio, Wave transmission

This paper investigates certain classes of data-smoothing procedures for use in problems where the objective is to estimate a set of parameters, on the basis of observed data which depend on these parameters and are also corrupted by noise. These procedures are in part motivated by possible application to orbit estimation problems, which the author believes may provide instances where the suggested procedures are computationally more convenient than those more commonly employed. However, potential applications exist to many other parameter estimation problems.

**AD-622 489 Div. 8/7 ,30/2**
**CFSTI Prices: HC $3.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**TABLE OF ERROR CORRECTING AND ERROR DETECTING FIRE CODES THROUGH GENERATOR DEGREE 33,**
by Patrick T. Komiske. 12 Feb 64, 51p. Rept. no. CF-3068
Contract NOw62 0604c
Unclassified report

Descriptors: (*Programming (Computers), Errors), (*Errors, Programming (Computers)), (*Corrections, Programming (Computers)), Tables, Computer logic, Communication theory, Polynomials

The binary fire codes are produced by a generator polynomial g (x) = p (x) (x squared - 1), where p (x) is of degree m. The codes are capable of correcting any single burst of errors of length b or less and of detecting any combination of two bursts of which the length of the shorter burst is no greater than m and the sum of the lengths is no greater than c + 1 as well as any single burst of length no greater than c + m, the number of check bits. The tables are formatted to facilitate selecting a particular code by listing in increasing order the burst correcting capability, increasing order of the irreducible polynomial exponent, and increasing magnitude of the check symbols, respectively. The power of the error burst detector, number of check symbols, code length, transmission efficiency, and order of the roots of the irreducible polynomial are listed.

**AD-622 829 Div. 8/7 ,8/3**
**CFSTI Prices: HC $3.00 MF $0.75**
*REZA (F M) SYRACUSE N Y*
**ON THE PROBABILISTIC CIRCUIT THEORY, II.**
Technical rept. for Jul-Sep 65,
by F. M. Reza. Sep 65, 82p. Contract AF30 602 3252 Proj. 8505
RADC , TR-65-134
Unclassified report

See also AD-603 249.

Descriptors: (*Circuits, Communication theory), (*Communication theory, Circuits), Electrical networks, Linear systems, Electrical properties, Statistical functions, Probability, Set theory

A probabilistic circuit is an electrical circuit where the element values in the circuit are not fixed, but are defined by some probability functions. The existing literature deals almost solely with the case of gaussian signal and noise. In the case of a probabilistic system the central problem is a characterization of over-all system functions in terms of component probability distributions. The present

research reported in Part II revolves around this theme, suggesting the successive approximation of lognormal and normal probability distributions. An additive communication channel in the presence of independent noise is perhaps the most widely simulated model of communication. In the present work, emphasis is placed on signals which are nearly normal in contrast with strictly normal signals used in literature. The novel problem presented in this research is the possibility of finding new upper limits for the transmission of information in the presence of a certain type of nongaussian noise. Part III of this report contains the main results of our research in this area. Part IV contains the necessary background of probability theory. (Author)

**AD-623 044 Div. 8/7 ,15/1**
*RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE*
**SOME ASPECTS OF THE WIENER THEORY OF NONLINEAR SYSTEMS,**
by Y. W. Lee, and M. Schetzen. 1965, 6p. Contract DA36 039AMC03200E Grant ,NSF GP2495
Unclassified report

Pub. in Proceedings of the National Electronics Conference v21 p759-64 1965 (Copies not available to DDC or Clearinghouse customers). Research supported by NASA, Grant NsG496.

Descriptors: (*Harmonic analysis, Nonlinear systems), (*Communication theory, Statistical processes), Functions, Integrals, Circuits, Noise (Radio), Errors

**AD-623 055 Div. 8/7 ,25/4**
*RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE*
**AMPLITUDE NOISE IN LASER OSCILLATORS,**
by H. A. Haus. 2 Apr 65, 2p. Contract DA36 039AMC03200E
Unclassified report

Pub. in I E E E Journal of Quantum Electronics, vQE1 n4 p179-80 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Noise), (*Masers, Noise), (*Oscillators, Noise), Amplitude modulation, Quantum mechanics, Cavity resonators

An analysis is presented of the amplitude noise in a maser oscillator represented by the van der Pol equivalent circuit, based on a corrected version of the method of Mullen (Proc. IRE, 48:1467, 1960). The spectral density and power spectra, both above and below threshold, are evaluated.

**AD-622 517** **See Fld. 20/10**

**AD-622 697** **See Fld. 9/1**

**AD-622 710** **See Fld. 20/1**

**AD-622 786** **See Fld. 17/2**

**AD-623 000** **See Fld. 20/6**

## 9/5. SUBSYSTEMS

**AD-622 376 Div. 8/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**A SMALL SIZE MAGNETIC ANTENNA,**
by M. M. Savkin, and A. N. Rumyanstev. 28 Sep 65, 5p. Rept. no. FTD-TT-65-749 TT , 65-64158
Unclassified report

Unedited rough draft trans. of Russian Patent 165 787, appl. no. 789065/26-9, 24 Jul 62. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Antennas, Ferromagnetic materials), Antenna radiation patterns, Antenna configurations, USSR

The object of the invention is a small-size magnetic antenna with a ferrite core for radio frequency communication along directing metal conductors on shafts. The ferrite core is in the form of a half-ring for improving radiation direction to the side of the conductor and decreasing its dimensions. (Author)

**AD-622 472 Div. 8/1**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**A METHOD OF RADOME COMPENSATION WITH BROADBAND CAPACITY,**
by R. H. Hallendorff. 10 Aug 64, 40p. Rept. no. CF-3101
Contract NOw62 0604c
Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Radomes, Broadband), Ceramic materials, Radar antennas, Boresighting, Taper, Aircraft antennas, Tests

Boresight error measurements on tapered solid wall radomes have provided an experimental boresight bandwidth of 3.6%. Boresight bandwidth is defined as the frequency band where boresight error slopes are less than .01 degree/degree in any 20 degree gimbal period. Theoretical bandwidths estrapolated from experimental data indicate that bandwidths as high as 5% are obtainable with ceramic radomes.

**AD-622 709 Div. 8/1**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS MICROWAVE PHYSICS LAB*
**THE BACKFIRE ANTENNA: NEW RESULTS.**
Instrumentation papers,
by Hermann W. Ehrenspeck. Sep 65, 10p. Rept. no. IP-77
Proj. 5635 Task 563502
AFCRL , 65-647
Unclassified report

Pub. in Proceedings of the IEEE v53 n6 p639-41 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Dipole antennas, Gain), S band, Antenna radiation patterns, Antennas, Reflectors

The backfire antenna described in this publication is a high gain directional antenna. It uses a plane reflector for obtaining gain figures which until recently could be only obtained from paraboloidal antennas. The backfire has a low sidelobe level and an extremely low backward radiation. (Author)

**AD-622 938 Div. 7/5 ,14/6 ,14/8**
**CFSTI Prices: HC $2.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**MATERIALS FOR ELECTROSTATIC AND ELECTROMAGNETIC GENERATORS: COMPILATION OF ABSTRACTS BASED ON SOVIET OPEN LITERATURE.**
AID Work assignment no. 51.
5 Mar 64, 29p. Rept. no. AID-U-64-8 TT , 65-64283
Unclassified report

Based on Soviet open-source materials.

Descriptors: (*Generators, Materials), (*Electric insulation, Plastics), USSR, Abstracting, Plastic coating, Hermetic seals, Ceramic coatings, Impregnation, Electric wire, Electric motors, Performance (Engineering)

**AD-622 989 Div. 8/1**
**CFSTI Prices: HC $4.00 MF $0.75**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**HORIZONTALLY POLARIZED OMNIDIRECTIONAL RADIATION CLOSE TO A CONDUCTING PLANE.**
Master's thesis,
by Frank G. Alexander, and Oakley G. Vincent. Aug 65, 104p. Rept. no. GE/EE/65-2
Unclassified report

Descriptors: (*Antenna radiation patterns, Omnidirectional antennas), (*Loop antennas, Antenna simulators), Polarization, Gain, Dielectric properties, Waveguides

A loop antenna is simulated by four end-fire arrays. The effects of three methods to increase the intensity of the E (tan) component of radiation near a conducting ground are shown. The theoretical basis for the three methods are given. A combination of two of the methods, namely, trapped modes in a dielectric slab excited by a parallel plane waveguide, given field patterns with major lobes near the plane of the ground. This combination shows promise of giving a gain of 14 db near the plane of a finite ground if no limitations on the length of dielectric are imposed. (Author)

**AD-623 013 Div. 7/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*UNION CARBIDE CORP PARMA OHIO RESEARCH LAB*
**THIN FUEL CELL ELECTRODES.**
Quarterly progress rept. no. 1, 1 May-31 Jul 65,
by M. B. Clark, and K. V. Kordesch. 31 Jul 65, 44p. Contract DA28 043AMC01344E Task 1C6 22001A053 04
Unclassified report

Rept. no. 5 on Contract DA36 039AMC02314E.

Descriptors: (*Electrodes, Fuel cells), (*Fuel cells, Electrodes), Gases, Transport properties, Air, Hydrogen, Diffusion, Electrolytes, Tests, Electrical properties, Batteries + components

Gas diffusion and electrolyte concentration phenomena have been studied by varying thicknesses of the layers from which thin electrodes are constructed. Air cathodes showed a more pronounced response to thickness of the layers than did hydrogen anodes. The effect of a wetted porous layer in front of the electrode is to reduce cell output, but not in a linear fashion. The principal design features of a 6-volt, 100-watt air-hydrogen fuel cell are described. Tests on single cells of the same size are reported, and the test program for the batteries is outlined accordingly. (Author)

**AD-623 036 Div. 7/5**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**TI DIODE SYSTEM STUDY,**
by Joseph P. Angello. 20 May 65, 5p.
Unclassified report

Pub. in Annual Proceedings Power Sources Conference (19th) May 18, 19, 20, 1965 (Copies not available to DDC or Clearinghouse customers). Session on Thermal Energy Conversion.

Descriptors: (*Thermionic converters, Diodes (Semiconductor)), (*Diodes (Semiconductor), Thermionic converters), Energy conversion, Thermocouples, Electric power production, Heat transfer

The concepts of thermally conditioned connector leads, and a low voltage input dc-dc converter, should be incorporated in the design of fossil fueled thermionic generators. This is especially important for portable generators because the major emphasis is placed on efficiency and low weight. In addition, the versatility of this system concept is such that by flipping a switch, the transistorized converter can be designed to produce 6, 12 and 24 volt outputs with very little increase in weight or loss in efficiency. Cost considerations will probably favor the use of thermionic generators in certain applications. The standardization to a minimum diode size which can be used as a "building block" for a family of generators will greatly reduce diode development and production costs, and in addition--reduce inventory costs and problems. The use of a 'Cooling Tower' to thermally condition the electrical connector leads shows the potential of being an effective heat sink for both the thermionic diode and the dc-dc converter and will help resolve the critical design problems of the thermionic diode--low input voltage converter combination.

**AD-623 072 Div. 8/1**
**CFSTI Prices: HC $3.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS*
**ANTENNA LOBE SUPPRESSION. VOLUME I. MODIFICATION OF HORN ANTENNAS FOR LOW SIDELOBE LEVELS.**
Final rept., vol. 1,
by R. Lawre, L. Peters,Jr., and C. Davis. Oct 65, 52p. Rept. no. RF-1767-2
Contract AF30 602 3269 Proj. 4540 Task 454003
RADC , TR-65-186 V1
Unclassified report

See also AD-623 073.

Descriptors: (*Horn antennas, Antenna lobes), (*Antenna lobes, Horn antennas), Performance (Engineering), Antenna radiation patterns, Parabolic antennas, Efectromagnetic shielding, Microwaves, Diffraction gratings, Diffraction, Surfaces

Four modified horn antennas with greatly reduced backlobes are described. The principal method of reducing backlobes consists of preventing the energy from illuminating the edges from which it is diffracted into the back regions. The mechanism for forcing energy away from these edges is the use of microwave absorber material, choke slots, and corrugated surfaces. An additional feature of these devices is an extremely smooth main beam with no discernible sidelobes. A diffraction screen has also been constructed that makes use of this principle. Such screens should find application in the reduction of ground clutter in radar systems. (Author)

**AD-623 073 Div. 8/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS*
**ANTENNA LOBE SUPPRESSION. VOLUME II. THE E-PLANE RADIATION PATTERN OF AN ANTENNA MODEL FOR HORN ANTENNAS.**
Final rept., vol. 2,
by J. S. Yu, and R. C. Rudduck. Oct 65, 61p. Rept. no. RF-1767-3
Contract AF30 602 3269 Proj. 4540 Task 454003
RADC , TR-65-186 V2
Unclassified report

See also AD-623 074.

Descriptors: (*Horn antennas, Antenna lobes), (*Antenna lobes, Horn antennas), Antenna radiation patterns, Numerical analysis, Diffraction, Performance (Engineering), Theory

Diffraction theory is used in analyzing the radiation characteristics of typical horn antennas. The far-sidelobe radiation has been solved without employing equivalence principles which are impractical in the problem. A corner reflector with a magnetic line source located at the vertex is proposed as a model for the E-plane radiation of horn antennas. Diffraction theory is applied to formulate the radiation pattern of this antenna model. A complete pattern, including multiple interactions and images of induced line sources, is obtained in infinite series form. Diffraction mechanisms are used for appropriate approximations in the computations. Emphasis is made on the continuity of the radiation patterns. The computed patterns are in excellent agreement with measured patterns of typical horn antennas. Radiation intensity of the backlobe relative to main-lobe intensity is obtained as backto-front ratio and plotted as a function of antenna dimensions. A set of measured back-to-front ratios is presented to demonstrate the validity of computation. (Author)

**AD-623 074 Div. 8/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS*
**ANTENNA LOBE SUPPRESSION. VOLUME III. RADIATING MECHANISMS IN A REFLECTOR ANTENNA SYSTEM.**
Final rept., vol. 3,
by Leon Peters,Jr., and Terrence E. Kilcoyne. Oct 65, 17p. Rept. no. RF-1767-4
Contract AF30 602 3269 Proj. 4540 Task 454003
RADC , TR-65-186 V3
Unclassified report

See also AD-623 075.

Descriptors: (*Antenna lobes, Parabolic antennas), (*Parabolic antennas, Antenna radiation patterns), Antenna feeds, Horn antennas, Reflectors, Diffraction, Performance (Engineering)

The corrugated horn represents a good feed in a reflector antenna system. It is used in this report as a feed for an offset parabolic antenna. The various radiation mechanisms are discussed and means are suggested for further reduction of undersired radiation. (Author)

**AD-623 075 Div. 8/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS*
**ANTENNA LOBE SUPPRESSION. VOLUME IV. THE H-PLANE RADIATION PATTERN OF HORN ANTENNAS.**
Final rept., vol. 4,
by J. S. Yu, and R. C. Rudduck. Oct 65, 48p. Rept. no. RF-1767-5
Contract AF30 602 3269 Proj. 4540 Task 454003
RADC , TR-65-186 V4
Unclassified report

See also AD-623 076.

Descriptors: (*Antenna lobes, Horn antennas), (*Horn antennas, Antenna lobes), Antenna radiation patterns, Diffraction, Theory, Performance (Engineering), Numerical analysis

Diffraction theory is used to formulate the H-plane radiation pattern of a horn antenna. Excellent agreement between computed and measured patterns is achieved by considering contributions from both the principal H-plane and E-edge diffractions. The pattern is computed by superposition of various diffracted rays which are described by wedge diffraction. This technique is demonstrated to be a accurate and practical without employing aperture integration techniques. (Author)

**AD-623 076 Div. 8/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS*
**ANTENNA LOBE SUPPRESSION. VOLUME V. GRATED REFLECTOR ANTENNAS FOR SPURIOUS RADIATION REDUCTION.**
Final rept., vol. 5,
by Richard E. Lawrie. Oct 65, 28p. Rept. no. RF-1767-6
Contract AF30 602 3269 Proj. 4540 Task 454003
RADC , TR-65-186 V5
* Unclassified report

See also AD-623 077.

Descriptors: (*Antenna lobes, Parabolic antennas), (*Parabolic antennas, Antenna lobes), Antenna radiation patterns, Reflectors, Diffraction gratings, Waveguides, Attenuation, Wedges, Radiofrequency interference, Numerical analysis, Performance (Engineering)

A method of reducing the radio frequency interference resulting from radiation at spurious frequencies by utilizing the frequency sensitivity of grating reflectors is examined. A technique is presented whereby the attenuation in a radial-wedge waveguide operating beyond cutoff may be calculated. (Author)

**AD-623 077 Div. 8/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS*
**ANTENNA LOBE SUPPRESSION. VOLUME VI. DIFFRACTION BY CONDUCING WALLS OF FINITE THICKNESS.**
Final rept., vol. 6,
by J. S. Yu, and R. C. Rudduck. Oct 65, 48p. Rept. no. RF-1767-7
Contract AF30 602 3269 Proj. 4540 Task 454003
RADC , TR-65-186 V6
Unclassified report

See also AD-623 076.

Descriptors: (*Antenna lobes, Horn antennas), (*Horn antennas, Antenna lobes), Antenna radiation patterns, Diffraction, Wedges, Thickness, Theory, Equations, Numerical analysis, Performance (Engineering)

Diffraction of thick walls is computed by the superposition of wedge diffractions. A new method for computing certain wedge diffractions is derived in series form of cylindrical wave functions to overcome deficiencies in Fresnel integral form. Diffraction characteristics of certain wedges are computed by both forms as functions of wedge geometry. A new technique is employed to formulate simultaneous linear equations for solving unknown coupling coefficients among wedges of a thick wall. The coupling coefficients thus solved are used to obtain continuous radiation patterns of different configurations of a thick wall. Thick wall diffraction is applicable to reduction of backlobe radiation of aperture antennas. In this regard, the electromagnetic compatibility of a thick wall for use of typical horn antennas is discussed. (Author)

**AD-622 381** See Fld. 20/12

**AD-622 382** See Fld. 20/12

**AD-622 403** See Fld. 20/14

**AD-622 408** See Fld. 20/3

**AD-622 481** See Fld. 22

**AD-622 483** See Fld. 22

AD-622 514 See Fld. 21/5

AD-622 580 See Fld. 10

AD-622 635 See Fld. 5/1

AD-622 719 See Fld. 10

AD-622 910 See Fld. 20/3

AD-622 945 See Fld. 10

## 10. ENERGY CONVERSION (NON-PROPULSIVE)

**AD-622 580 Div. 7/6 ,7/5 ,25/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*STANFORD RESEARCH INST MENLO PARK CALIF*
**THERMOELECTRIC MATERIALS.**
Summary rept. for 1 Jan 62-8 Apr 63,
by J. W. Johnson. 15 May 63, 17p. Contract NObs77017 Proj. SRI PAU2681
Unclassified report

Descriptors: (*Thermoelectricity, Materials), (*Electric power production, Thermoelectricity), Inorganic compounds, Liquids, Energy conversion, Thermal conductivity, Copper compounds, Bismuth compounds, Nickel compounds, Lead alloys, Sulfides, Tellurium alloys, Copper alloys

The following conclusions are specifically concerned with the objective of producing a liquid suitable for power generation: (1) The composition 25 mol percent cuprous sulfide-75 mol percent cuprous telluride is suitable for consideration as the p-type leg of a liquid thermoelectric power generator. However, the temperature at which the material is liquid is quite high which limits its application. (2) The development of an n-type liquid having properties comparable to the cuprous sulfide-cuprous telluride composition is likely to be much more difficult to realize. A possible system may be a bismuth sulfide based materials (Author)

**AD-622 719 Div. 7/6 ,7/5 ,4/3 ,16/3**
**CFSTI Prices: HC $4.00 MF $0.75**
*MELPAR INC FALLS CHURCH VA*
**BIOCHEMICAL FUEL CELL.**
Final rept. for 1 Jul 62-30 Jun 65,
by Gordon C. Blanchard, and Charles R. Goucher. 30 Jun 65, 113p. Rept. no. 12
Contract DA36 039sc90878 Proj. 1C6 22001A053 Task 1C6 22001A05304
Unclassified report

Descriptors: (*Fuel cells, Biochemistry), (*Microorganisms, Fuel cells), (*Gas generating systems, Bacteria), Clostridium welchii, Hydrogen, Culture media, Glucose, Metabolism, pH

The study demonstrated the feasibility of using microorganisms to produce hydrogen in quantity and purity from natural products for use in simple fuel cell equipment. The study showed Clostridium welchii to be the best organism, and glucose or maltose the best substrate. Optimum conditions for maximum rate of hydrogen evolution both by resting and growing cells in 10-liter containers were evaluated. The maximum rate was 23 liters/hour. Cucumbers and banana proved to be the best natural products. A simple microbial generator using artificial and natural product substrates produced a 3.5-watt output for 24 hours. A periodic pH adjustment was required to maintain this output. Potential field applications for this process are discussed. (Author)

**AD-622 945 Div. 7/6 ,7/5 ,25/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE*
**RESEARCH ON NEW CONCEPTS IN ENERGY CONVERSION.**
Quarterly technical progress rept. no. 8, 1 Jun-31 Aug 65,
by W. D. Jackson, G. A. Brown, J. L. Kerrebrock, and R. E. Stickney. 15 Aug 65, 35p. Contract AF33 615 1083 Proj. 5350 Task 535004
Unclassified report

See also AD-618 071.

Descriptors: (*Energy conversion, Magnetohydrodynamics), (*Magnetohydrodynamics, Energy conversion), (*Thermionic converters, Materials), Steam, Condensers (Liquefiers), Jet pumps, Plasma medium, Fluid dynamic properties, Alkali metals, Vapors, Single crystals, Tungsten, Emissivity, Brayton cycle, Generators

Brief summaries are given of progress on the following projects: Liquid-metal pumps for magnetohydrodynamic power generation; Liquid-metal magnetohydrodynamic generators; Alkali-metal vapor magnetohydrodynamic generator; Segmented-electrode generator experiment; Thermionic emission from a tungsten crystal; Bonding mechanisms of alkali-metal atoms adsorbed on metal surfaces; Volume ionization mechanisms and transport properties of thermionic diodes; Collisionless thermionic converters. Also included are the following detailed reports: Steam-water condensing ejector test facility; Magnetohydrodynamic channel flow velocity profiles and entry length; Thermionic emission from a tungsten monocrystal in oxygen; Characteristics of a pure alkalimetal vapor plasma; Brayton cycle magnetohydrodynamic power generation.

## 10/3. ENERGY STORAGE

**AD-622 423 Div. 7/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**SILVER ZINC STORAGE BATTERY.**
24 Sep 65, 6p. Rept. no. FTD-TT-65-809 TT , 65-64170
Unclassified report

Unedited rough draft trans. of mono. Stribrozinkovy Akumulatorovy Clanek, n.p. (Czechoslovakia) 1964 p1-2.

Descriptors: (*Storage batteries, Performance (Engineering)), Czechoslovakia, Silver, Zinc

The basic parameters of silver zinc batteries made in Czechoslovakia are made with batteries made in other countries.

**AD-622 698 Div. 7/1 ,26/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J ELECTRONIC COMPONENTS LAB*
**DRY PROCESS DIVALENT SILVER OXIDE ELECTRODES.**
Technical rept.,
by Nicholas T. Wilburn, Kenneth E. Meade, and Charles J. Bradley. Sep 65, 69p. Proj. 1C6 22001A053 Task 1C6 22001A05302 ECOM , 2628
Unclassified report

Descriptors: (*Electrodes, Alkaline cells), (*Silver compounds, Oxides), Binders, Powder, Mechanical working, Performance (Engineering), Effectiveness

Silver oxide positive electrodes for use in zinc-silver oxide batteries have been made traditionally by the electroformed process, a lengthy, cumbersome and relatively expensive method. Attempts in the past to make the electrodes in one step, by applying the divalent silver oxide (AgO) directly to a grid with a suitable binder, have been unsuccessful due to poor mechanical strength. Such electrodes would, however, be highly desirable. In addition to substantial cost savings in production, they would have a greater uniformity, a higher discharge efficiency, and no trace of the objectionable initial high voltage 'hump' of the conventional electroformed positive electrode. The development of a successful dry process silver oxide electrode was made possible by a simple but effective technique developed at USAECOM. This report covers this activity with suggestions on the adaptation of the method for use in the high speed, low cost production of silver oxide battery electrodes. (Author)

**AD-622 818 Div. 7/1 ,4/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*ROCKETDYNE CANOGA PARK CALIF*
**HIGH ENERGY BATTERY SYSTEM STUDY.**
Rept. no. 8 (Final), 1 Jul 63-30 Jun 65,
by J. Farrar, R. Keller, and M. M. Nicholson. 30 Jun 65, 69p. Rept. no. R-5405-8
Contract DA36 039AMC03201E Proj. DA1C6 22001A053 Task DA1C6 22001A053 02
Unclassified report

See also AD-617 714.

Descriptors: (*Primary cells, Electrochemistry), (*Electrodes, Materials), (*Electrolytes, Organic materials), Lithium, Magnesium, Aluminum, Cyanogen, Bromides, Chlorides, Fluorides, Copper compounds, Silver compounds, Bromine, Carbonates, Performance (Engineering)

Lithium, magnesium, and aluminum were studied as anode materials in statistically planned experimentation. Calcium and beryllium were also examined during subsequent tests. Lithium emerged as the outstanding anode material with a mean open circuit potential of -2.71 volts vs Ag/AgBr, limiting currents exceeding 10 ma/sq. cm., and utilization efficiencies of approximately 100 percent. Two dozen solids were tested as potential cathode sq. cm. materials. At low discharge rates of 1 to 5 ma/sq. cm. BrCN, CuCl2, and CuF2 proved to be the most promising although performances were less favorable at higher current densities. Bromine and water showed the best prospect for attaining the performance goal although they can only be used in reserve systems. Propylene carbonate was favored as the electrolyte solvent for a lithium cell, with 0.03/ohm/cm being the highest conductivity value observed for organic aprotic electrolytes. Calculations show that BrCN, CuCl2 or CuF2 cathodes coupled with lithium anodes can meet the performance goals for this program. (Author)

**AD-622 822 Div. 7/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*EAGLE-PICHER CO JOPLIN MO COUPLES DEPT*
**INVESTIGATIONS LEADING TO THE DESIGN AND DEVELOPMENT OF MAGNESIUM/MAGNESIUM PERCHLORATE BATTERIES.**
Rept. no. 4 (Final), 1 Jul 64-30 Jun 65,
by James R. Sharpe. 30 Jul 65, 91p. Contract DA28 043AMC00221E Proj. DA1C6 22001A53 Task DA1C6 2001A053 02
Unclassified report

See also AD-618 497.

Descriptors: (*Storage batteries, Magnesium), (*Magnesium, Storage batteries), Magnesium compounds, Perchlorates, Design, Electrolytes, Mercury compounds, Oxides, Magnesium alloys, Freezing point depressants

The report describes the significant accomplishments made on the research and development of magnesium/ magnesium perchlorate batteries. Data concerning voltage and temperature vs. type

magnesium alloy are presented. Performance characteristics of Mg-HgO multicell batteries at low and high temperatures are discussed. Variations of electrolyte concentration and freezing point depression are discussed. Batteries for three military field applications were developed to meet the desired specifications. (Author)

**AD-622 907 Div. 7/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NICKEL CADMIUM BATTERY CORP EASTHAMPTON MASS*
**LABORATORY INVESTIGATIONS AND RESEARCH TOWARD THE DEVELOPMENT OF NICKEL CADMIUM ALKALINE STORAGE BATTERIES.**
Quarterly progress rept. no. 2.
31 Dec 46, 8p. Contract W36 039sc32271
Unclassified report

See also AD-205 026.

Descriptors: (*Storage batteries, Alkaline cells), Battery separators, Nickel, Cadmium, Powder metals, Impregnation

The period covered by this report was used to procure the equipment needed for conducting research, to obtain the required raw materials and to plan the actual experiments to be conducted during the quarter ending March 31, 1947. No tangible progress can be reported in this paper. (Author)

**AD-622 908 Div. 7/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NICKEL CADMIUM BATTERY CORP EASTHAMPTON MASS*
**LABORATORY INVESTIGATIONS AND RESEARCH TOWARD THE DEVELOPMENT OF NICKEL CADMIUM ALKALINE STORAGE BATTERIES.**
Quarterly progress rept. no. 1.
30 Sep 46, 20p. Contract W36 039sc32271
Unclassified report

Descriptors: (*Storage batteries, Alkaline cells), (*Alkaline cells, Storage batteries), Electrodes, Sintering, Powder metals, Temperature, Time, Performance (Engineering), Electrolytes, Lithium compounds, Oxides, Manufacturing methods

A brief statement of the work accomplished is presented. The work includes a general investigation, a preparation of a schedule of required experimental equipment and ordering of same and tests on sample German sintered plates. Factors involved in the investigation include: (a) Methods of preparation and the characteristics of metal powders and the effects of sintering time vs. temperature. (b) Differences in German procedures in manufacture of sintered plates in 1937 and during the recent war. (c) Comparison of flat pocket type Ni-Cad and sintered plate type Ni-Cad batteries as to relative weights and ampere hour capacities per unit volume, relative volumes and ampere hour capacities per unit weight and relative volumes and weights per unit of ampere hour capacity. (d) Use of Lithia in the electrolyte. (e) Possible factors affecting the life of the sintered plate battery. (Author)

**AD-622 916 Div. 7/1 ,26/1 ,4/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*NICKEL CADMIUM BATTERY CORP EASTHAMPTON MASS*
**INVESTIGATION TOWARD THE DEVELOPMENT OF CARBONYL NICKEL POWDER SUITABLE FOR THE MANUFACTURE OF SINTERED NICKEL PLAQUES FOR USE IN ALKALINE STORAGE BATTERIES,**
by Arthur Fleischer. 1 May 48, 41p. Contract W28 003sc1489
Unclassified report

Descriptors: (*Alkaline cells, Nickel), (*Storage batteries, Nickel), (*Nickel, Electrodes), Nickel compounds, Carbon compounds, Oxygen compounds, Sintering, Powder metals, Manufacturing methods

An analysis has been made of the existing literature, including patents, on the manufacture of nickel powder from nickel tetracarbonyl to produce a powder of low apparent density and suitable for use in making sintered plaques for alkaline batteries. On the basis of this data and ideas developed during the investigations of the sintered plate battery, a design is proposed for a pilot apparatus to produce 100 grams of carbonyl nickel powder per hour. Attention has been given to safety features, expression of design in terms of chemical engineering indices, including mass and heat transfer, and to the kinetics of the reaction in terms of operating procedure and the final properties of the powder. (Author)

**AD-623 024 Div. 7/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*EAGLE-PICHER CO JOPLIN MO COUPLES DEPT*
**ADVANCED DEVELOPMENT MODELS OF SEALED NICKEL-CADMIUM BATTERIES.**
Final rept. for 5 Apr 64-16 Aug 65,
by Jeff K. Wilson. 16 Aug 65, 20p. Rept. no. NA-122
Contract DA28 043AMC00070E Proj. 1C6 22001A053
Unclassified report

Descriptors: (*Storage batteries, Alkaline cells), Nickel, Cadmium, Hermetic seals, Ceramic materials, Electrolytes, Potassium compounds, Hydroxides, Battery separators, Plastics, Life expectancy, Performance (Engineering)

Development and production work has been directed toward the production of forty (40) each BB-467/U, BB-468/U, BB-469/U, BB-470/U, BB-471/U, and BB-472/U sealed nickel-cadmium batteries. The work has been directed toward the attainment of a new line of nickel-cadmium batteries in accordance with the Signal Corps Technical Requirements SCL-6868B. The batteries have ceramic seals, sintered nickel plaque plates, pellon and polypropylene separation, and contain 1.300 sp. gr. KOH electrolyte. The batteries must meet the specifications as stated in SCL-6868B. These specifications require batteries to discharge at -40F, meet stand test requirements at +80F and +160F, undergo temperature cycling, mechanical shock, acceleration, vibration, constant overcharge, and cycle life tests. Early models of these batteries have passed all these requirements except those for cycle life. Emphasis was placed on cell capacity, high rate discharge, storage at +160F, and constant overcharge using BB-467/U batteries for the development units. (Author)

**AD-622 405** **See Fld. 9/1**

## 11/1. ADHESIVES AND SEALS

**AD-623 059 Div. 14/1 ,30/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*MINNESOTA UNIV MINNEAPOLIS DEPT OF AERONAUTICS AND ENGINEERING MECHANICS*
**MEASUREMENT OF COMPLEX SHEAR MODULUS OF THIN VISCOELASTIC LAYERS.**
Technical rept.,
by H. E. Miller, J. L. Jurgens, and R. Plunkett.
Oct 65, 22p. Rept. no. TR-65-4
Contract NObs92285
Unclassified report

Descriptors: (*Adhesives, Shear stresses), Viscoelasticity, Measurement, Sandwich construction, Vibration, Damping, Strain (Mechanics), Mechanical properties

A method was developed for measuring the complex shear modulus of thin viscoelastic layers of adhesive using standard mechanical impedance equipment. The measurement is direct and the data can be quickly obtained once the environmental factors are fixed. It was found that the effective shear modulus of the adhesive as used in this test is much less than that of the material itself although the loss tangent is about the same. It was also found that transverse strain did not affect the true shear modulus, even for transverse extensions as large as 100%. (Author)

## 11/2. CERAMICS, REFRACTORIES, AND GLASSES

**AD-622 970 Div. 14/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**ANNEALING EFFECTS ON MICROSTRUCTURE AND DIELECTRIC PROPERTIES OF HOT-PRESSED, ULTRAFINE GRAINED BATI03,**
by R. J. Brandmayr, Arthur E. Brown, and Annie M. Dunlap. May 65, 35p. Rept. no. ECOM-2614
Proj. 1Co 24401A112 Task 1C0 24401A112 03
Unclassified report

Descriptors: (*Ferroelectric materials, Heat treatment), (*Barium compounds, Titanates), Microstructure, Dielectric properties, Hot working, Particle size

Dense barium titanate bodies with a grain size of 0.05 micron have been prepared by hot-pressing high purity material at temperatures as low as 1475F. The dielectric properties of this material and also for samples which have been annealed to grow larger grains are reported. Data which show the variation in dielectric constant and temperature stability with increasing grain size from 0.05 micron to about 6 microns are included. The dielectric constant reaches a maximum at a grain size of about 1 micron. (Author)

**AD-622 369** **See Fld. 20/12**

**AD-622 774** **See Fld. 5/1**

**AD-622 790** **See Fld. 18/8**

**AD-622 791** **See Fld. 18/8**

## 11/3. COATINGS, COLORANTS, AND FINISHES

**AD-622 555** **See Fld. 1/5**

**AD-622 559** **See Fld. 19/6**

## 11/5. FIBERS AND TEXTILES

**AD-622 688 Div. 14/4 ,25/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*HONEYWELL RESEARCH CENTER HOPKINS MINN*
**THE FIBER STRENGTHENED ELASTIC STRING, FIRST ORDER THEORY.**
Technical rept.,
by H. Cohen. Sep 65, 27p. Rept. no. TR-31
Contract Nonr407600 Proj. NR032 451
Unclassified report

Descriptors: (*Elasticity, Fibers), (*Fibers, Elasticity), Strain (Mechanics), Continuum mechanics, Invariance, Theory

The theory of a one-dimensional directed elastic continuum is developed on the basis of a principle of virtual work. The strain energy function is res-

tricted to lead to a theory of limited director interaction. A simplified form of the constitutive relations are used to illustrate the possibility of achieving a permanent deformation. (Author)

AD-622 344 See Fld. 11/9

## 11/6. METALLURGY AND METALLOGRAPHY

**AD-622 302 Div. 17/4 ,14/6 ,26/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*UNITED AIRCRAFT CORP EAST HARTFORD CONN RESEARCH LABS*
**RESEARCH INVESTIGATION OF PHASE-REINFORCED HIGH TEMPERATURE ALLOYS PRODUCED DIRECTLY FROM THE MELT.**
Final rept.,
by F. D. Lemkey, B. J. Bayles, and M. J. Salkind.
31 Jul 65, 96p. Rept. no. UACRL-D910261-4
Contract DA19 020AMC00434X Proj. DA 1A024401A111
AMRA , CR-64-05/4

Unclassified report

See also AD-453 442.

Descriptors: (*Fiber metallurgy, Composite materials), (*Composite materials, Fiber metallurgy), (*Heatresistant metals + alloys, Fiber metallurgy), (*Eutectics, Fiber metallurgy), (*Reinforcing materials, Single crystals), Nickel alloys, Beryllium alloys, Tantalum alloys, Nickel compounds, Borides, Titanium alloys, Tantalum compounds, Carbides, Boron alloys, Microstructure, Fracture (Mechanics), Zone melting, Ceramic fibers, Mechanical properties, Grain structures (Metallurgy)

An investigation has been performed to produce high temperature, high strength whisker reinforced alloys directly from the melt. The technique of unidirectional solidification has been applied to the Ni3B-Ni, Ni-NiBe, Ti-TiB and Ta-Ta2C eutectic systems. These systems are summarized.

**AD-622 442 Div. 17/7 ,30/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL RESEARCH LAB WASHINGTON D C*
**EXAMINATION OF ELECTRON BOMBARDMENT HEATING FOR EFFECTS ON THE TENSILE PROPERTIES OF TUNGSTEN.**
Final rept.,
by H. Doering, and P. Shahinian. 23 Mar 65, 11p.
Rept. no. NRL-6278
Proj. RR007 01 46 5407

Unclassified report

Descriptors: (*Tungsten, Tensile properties), (*Electron bombardment, Tungsten), (*Heating, Electron bombardment), Heating, Electron beams, Thermal radiation, Degradation, Temperature, Microstructure, fracture (Mechanics), Test methods, High-temperature research, Radiation damage

The effects of heating with 10-kv electron beams were studied by comparing the tensile properties of tungsten heated by electron bombardment and by thermal radiation. Bombarded specimens with both undisturbed and visibly damaged surfaces were tested at both room and high temperatures. At 2200C the ultimate tensile strength obtained when heating by thermal radiation was found to be the same as the strength obtained when heating by electron bombardment. Also, prolonged bombardment heating at 2400C under conditions not producing any surface changes prior to testing did not influence the tensile properties when compared to heating by thermal radiation. Normal strengths were reduced by bombardment only when surfaces were visibly damaged, the reduction being greatest at room temperature and considerably less at the higher temperature. The modes of fracture and the microstructure of failed specimens were independent of the means of heating. On the basis of these results it appears that electron bombardment heating, if properly applied, can be used in conducting valid mechanical property tests at high temperatures. (Author)

**AD-622 468 Div. 17/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PROBLEM OF ALLOYING HEAT RESISTANT NICKEL BASE ALLOYS,**
by V. G. Khoroshailov. 24 Sep 65, 14p. Rept. no. FTD-TT-65-650
TT , 65-64193

Unclassified report

Unedited rough draft trans. of Politekhnicheskii Institut, Leningrad. Trudy (USSR) n234 p89-95 1964.

Descriptors: (*Nickel alloys, Heat-resistant metals + alloys), (*Heat-resistant metals + alloys, Nickel alloys), USSR, Iron alloys, Cobalt alloys, Thermal properties, Solid solutions, Crystal structure, Surface-active substances, Reinforcing materials, Refractory metal alloys, Rare earth elements, Recrystallization

Investigations made during the development of iron, nickel and cobalt base heat resistant alloys established that heat resistant properties of alloys are determined: (1) by the nature of the solid solution, its crystalline structure; (2) by the degree of alloying with rock-phobic and rockphilic elements, which raise the recrystallization point and hinder the diffusion processes; (3) by the degree of alloying with surface-active elements; (4) by the degree of alloying with elements, forming reinforcers; (5) by the nature of the reinforcing phase.

**AD-622 477 Div. 17/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**EFFECT OF ALLOYING ON PHYSICO-MECHANICAL PROPERTIES OF NIOBIUM,**
by N. D. Tarasov, R. A. Ulyanov, and Ya. D.Mikhailov. 30 Sep 65, 15p. Rept. no. FTD-TT-65-915
TT , 65-64200

Unclassified report

Unedited rough draft trans. of Fizika Metallov i Metallovedenie (USSR) v18 n5 p740-5 1964. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Niobium alloys, High-temperature research), Solid solutions, Thermal expansion, Physical properties, Mechanical properties, Elasticity, Tensile properties, Chromium alloys, Rhenium alloys, Zirconium alloys, Iridium alloys, Boron alloys, Silicon alloys, Tantalum alloys, Tungsten alloys, Molybdenum alloys, Lanthanum compounds, USSR

Conclusions: Alloying of niobium in the area of solid solutions causes a rise in strength and reduction in plasticity of the alloys at room temperature in conformity with the general rules governing the strengthening of solid solutions; the most effective strengthening effect on niobium is produced by Cr, Re, Zr and Ir, considerably differing from niobium in atomic diameters. In proportion to the increase in concentration of solid niobium solutions with tantalum, tungsten, rhenium, molybdenum and iridium, there is an increase in elasticity modulus at room and high temperatures, there is an increase in characteristic temperature and in high temperature strength, thermal expansion coefficient decreases, which is evident by the increase in forces of interatomic reaction. In niobium alloys with heterogeneous structure of physico-mechanical properties are determined by the strengthening of the solid solutions and the characteristics of the second phase. In alloys with boron, lathanum and silicon maximum strengthening is caused by boron. (Author)

**AD-622 543 Div. 17/5 ,17/2 ,25/6**
*MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF METALLURGY*
**SUBSTRUCTURE AND MECHANICAL PROPERTIES OF A DRAWN AND ANNEALED IRON-SILICON ALLOY,**
by M. F. Comerford, and D. A. Thomas. 6 Feb 64, 8p.

Unclassified report

Pub. in Transactions of the Metallurgical Society of Aime v233 p1236-43 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Iron alloys, Silicon alloys), Mechanical properties, Drawing (Machine processing), Heat treatment, Nucleation, Grain boundaries, Hardness, Recrystallization, Heat of reaction, Tensile properties, Metallography, Deformation

Polycrystalline wires of Fe-3.2 wt pct Si were colddrawn to 31, 66, and 87 pct reductions of area. Mechanical properties and microstructures were studied after recovery and recrystallization. An initial increase in strength during recovery was ascribed to strain aging, and subsequent softening was largely due to polygonization rather than recrystallization. No unique activation energies could be determined for the recovery process. Rather, activation energies ranged from 60,600 cal per mole at 10 pct recovery to 83,200 cal per mole when recovery was 50 pct complete. Sites for the nucleation of recrystallization were found to depend on time and temperature. In the early stages of recrystallization, nucleation occurred in deformation bands. Later, or at high temperatures, recrystallized grains were nucleated primarily at grain boundaries. Polygonized structures did not seem to be preferred sites for nucleation. (Author)

**AD-622 632 Div. 17/2**
*BRIGHAM YOUNG UNIV PROVO UTAH*
**MELTING AND HIGH-TEMPERATURE ELECTRICAL RESISTANCE OF GOLD UNDER PRESSURE,**
by Daniel L. Decker, and Howard B. Vanfleet.
2 Nov 64, 5p. Contract AF AFOSR201 63
AFOSR , 65-1373

Unclassified report

Pub. in Physical Review v138 n1A pA129-33 Apr 5 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gold, Resistance (Electrical)), (*Resistance (Electrical), Gold), High-pressure research, High-temperature research, Melting, Metals, Phase studies

The electrical resistance of gold was measured over the temperature range 30C to the melting point and over a pressure range 0-70 kbar. At constant pressure, a sudden twofold increase in resistance sharply indicated the melting point and was used to determine the solid-liquid phase line to 70 kbar. The experimental melting curve has an initial slope, 5.91C/kbar, in very good agreement with Clapeyron's equation, and has a form satisfying a Simon's equation with a coefficient c = 2.2=0.1. The electrical resistance data show a decrease in the temperature coefficient of resistivity at higher pressures, while the resistance at the melting point appears to be a constant independent of pressure. (Author)

**AD-622 661 Div. 17/2 ,17/5**
*MASSACHUSETTS INST OF TECH CAMBRIDGE CORROSION LAB*
**EFFECT OF CARBON AND OXYGEN IN IRON ON STRESS CORROSION CRACKING IN NITRATE SOLUTION,**
by L. M. Long, and H. H. Uhlig. 14 May 65, 5p.

Contract DA31 124ARO D47
AROD , 2841:4

Unclassified report

Pub. in Journal of the Electrochemical Society v112 n10 p964-7 Oct 1965 (Copies not available to DDC or Clearinghouse customers). Prepared for presentation at Buffalo Meeting 10-14 Oct 1965.

Descriptors: (*Iron, Corrosion), (*Corrosion, Iron), (*Stresses, Corrosion), Fracture (Mechanics), Impurities, Carbon, Oxygen, Nitrates, Solutions, Corrosive liquids, Nitrogen, Iron alloys, Carbon alloys, Grain boundaries, Corrosion-resistant alloys

It was established previously that nitrogen or carbon in iron is necessary for susceptibility to stress corrosion cracking in boiling aqueous 60% Ca (NO3)2-3% NH4NO3. Present measurements show that oxygen in Fe at a concentration as high as 0.07% does not induce similar susceptibility. Pure iron-carbon alloys containing 0.001% N or less are susceptible as quenched from 925C if they contain more than about 0.002% C. Below this carbon content they are resistant. However, resistant alloys become susceptible when heated subsequently for 3 hr at 550C, including zone-refined iron containing <0.001% C and <0.003% N. Only 'floating' zone-refined iron of still higher purity is immune as quenched or when heated at 550C. These results are interpreted in terms of crack-sensitive paths consisting of interstitial atoms associated with imperfections of the grain boundaries. Quenched-in imperfections within grains transport interstitial atoms to grain boundaries which induce susceptibility of an otherwise resistant iron. (Author)

**AD-622 749 Div. 17/6 ,25/2**
*ROYAL MILITARY COLL OF CANADA KINGSTON (ONTARIO)*
**THERMALLY ACTIVATED INTERNAL FRICTION IN ALUMINUM,**
by T. S. Hutchison, D. H. Rogers, and R. R. Turkington. 17 Aug 64, 7p. Contract DRB7510 14

Unclassified report

Pub. in Journal of Applied Physics v36 n7 p2213-9 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Aluminum, Internal friction), Heat of activation, Damping, Cryogenics, Low-temperature research, Crystal lattice defects, Crystals

A series of maxima in the internal friction of aluminum at temperatures between 4.2 and 270 K are reported and analyzed. These maxima follow cold work and fast cooling of the specimen and occur on warm-up. The maxima are related to a mechanism of vacancy pinning of dislocations. Vacancies are indicated by the annealing characteristics of the phenomena. The vacancies in the model are supposedly produced by the cold work and are associated in strings or clusters. Extended dislocations move over saddle interaction energies and produce the relaxation maxima found at kilocycle frequencies. The megacycle attenuation measurements indicate the temperature at which the dislocation breaks from the pinned configuration. (Author)

**AD-622 782 Div. 17/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS MATERIALS ENGINEERING DIV*
**IMPACT PROPERTIES OF AIR- AND VACUUM-MELTED AISI 4340 STEEL.**
Technical rept.,
by George E. Gazza, and Frank R. Larson. Sep 65, 19p. Proj. DA1C024401A110 Task 35833
AMRA , TR-65-22

Unclassified report

Descriptors: (*Steel, Mechanical properties), Impurities, Melting, Air, Vacuum apparatus, Toughness, Impact shock, Tensile properties, Anistropy, Phosphorus, Sulfur, Heat treatment

Several commercial heats of air- and vacuum-melted AISI 4340 steel were investigated to determine their mechanical properties. Data were derived from Charpy impact tests and tensile tests. The effect of decreasing phosphorous and sulfur content is correlated with changes in impact energy at 100 percent fibrous fracture, mechanical anisotropy, and tensile properties. It is concluded that by reducing the phosphorous plus sulfur content to a maximum compositional limit of 0.020 weight percent, significant improvement in material toughness results and the degree of anisotropy is reduced. (Author)

**AD-622 809 Div. 17/4 ,4/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*BRUSSELS UNIV (BELGIUM) LABORATOIRE DE CHIMIE PHYSIQUE*
**MASS SPECTROMETRIC STUDY OF THE OXIDATION OF TUNGSTEN AND TANTALUM.**
Summary rept.,
by J. Drowart, F. Degreve, D. Detry, and S. Smoes. Aug 65, 17p. Contract AF61 052 700 Proj. 7312 Task 731202
ML , TR-65-145

Unclassified report

Descriptors: (*Tungsten, Oxidation), (*Tantalum, Oxidation), (*Oxidation, Refractory metals), Mass spectroscopy, High-temperature research, Reaction kinetics

The rates of oxidation of tungsten and tantalum were studied in the respective temperature intervals 1450-2500 and 1900-2900K at oxygen pressures between 8x10 to the minus 6th power and 7x10 to the minus 5th power Torr. The apparent partial pressures of the gaseous oxides formed, WO2, WO3, TaO and TaO2 were determined. The rate of oxidation of tantalum is strongly time dependent. At the maximum, the amounts of oxides produced represent for W and Ta respectively about 1/92 and 1/16 of the incident molecular oxygen. (Author)

**AD-622 881 Div. 17/4 ,25/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS*
**THE PROPERTIES OF SUPERCONDUCTING MO-RE ALLOYS.**
Final rept. for 1 Apr 63-31 Mar 65,
by J. G. Daunt, and E. Lerner. Aug 65, 40p. Contract AF33 657 10844 Proj. 7367 Task 736703
ML , TR-65-154

Unclassified report

Descriptors: (*Molybdenum alloys, Rhenium alloys), (*Rhenium alloys, Molybdenum alloys), (*Cryogenics, Molybdenum alloys), (*Superconductors, Molybdenum alloys), Superconductivity, Thermal conductivity, Resistance (Electrical), Magnetic properties, Transition temperature, Magnetic fields, Phase studies

This report gives details of the research carried out and the results obtained therefrom during this contract on the low temperature properties of Mo-Re alloys in the superconducting and normal states. Measurements were made on a variety of Mo-Re alloys in various states of anneal, the alloys being in the form of fine wires, as suitable for the winding of high-field superconducting solenoids. Micrograph studies were made to determine the percentage of the various phases present in each specimen. The low temperature measurements covered observations on the various specimens of (1) the electrical resistivity as a function of temperature and of magnetic field, (2) the magnetic moment as a function of temperature and magnetic field and (3) the thermal conductivity also as a function of temperature and magnetic field. The measurements yielded evaluations of the three critical magnetic fields, HsubC1, HsubC2, and Hsub3 as a function of temperature and alloy constitution, the transition temperatures TsubC and the Landau-Ginsburg parameters k. Detailed comparisons of the results are made with theoretical predictions and with results by previous authors on similar high-field superconducting alloys. (Author)

**AD-622 948 Div. 17/4 ,17/2**
*NAVAL AIR ENGINEERING CENTER PHILADELPHIA PA AERONAUTICAL MATERIALS LAB*
**INSTABILITY AND EVIDENCE OF ORDERING IN TI-8AL-LMO-LV ALLOY,**
by Paul J. Soltis. 22 May 64, 11p. Rept. no. NAEC-AML-2240

Unclassified report

Pub. in Transactions of the Metallurgical Society of AIME v233 p903-10 May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Titanium alloys, Metallography), Microstructure, Aluminum alloys, Molybdenum alloys, Vanadium alloys, Creep, Tensile properties, X ray diffraction analysis, Heat treatment, Ductility, Electron microscopy, Phase studies, Fracture (Mechanics), Nucleation

Direct as well as indirect evidence of alpha-phase ordering was found in a 'near-alpha' type titanium alloy, Ti-8Al-lMo-lV. The annealed alloy showed an anomalous decrease in second-stage creep rate at 950F (510C) and 47,500 psi. Anomalous increases were noted in initial yield stress after 500 hr creep exposure and in tensile strength after 1100 hr creep exposure. Debye-Scherrer X-ray diffraction patterns obtained on fine-grained polycrystalline speciment showed much line broadening and development of superlattice lines after 500 hr at 510C. Examination with the light and electron microscopes failed to reveal phase changes in thermally exposed material, but detailed metallography is presented illustrating the plastic and fracture characteristics of the alloy. Electronmetallographic evidence is presented, however, which shows the nature of the nucleation and growth of ordered regions from the disordered alpha in annealed material. (Author)

**AD-622 999 Div. 17/2 ,17/5**
**CFSTI Prices: HC $6.00 MF $1.25**
*BUREAU OF RECLAMATION DENVER COLO CHEMICAL ENGINEERING BRANCH*
**CORROSION OF SOME FERROUS METALS IN SOIL WITH EMPHASIS ON MILD STEEL AND ON GRAY AND DUCTILE CAST IRONS,**
by William A. Pennington. 9 Mar 65, 228p. Rept. no. ChE-26

Unclassified report

Descriptors: (*Steel, Corrosion), (*Iron, Corrosion), (*Corrosion, Pipes), Castings, Soils, Corrosionresistant alloys, Copper alloys, Nickel alloys, Chromium alloys, Underground structures, Corrosion inhibition, Protective treatments, Experimental data, Life expectancy

Wrought iron and steel are the best pipe materials for a given thickness, according to a USBR corrosion study, although gray cast iron in larger commercial sizes is the only material studied not requiring external coating for a 50-yr service life. The underground pitting corrosion study subjected National Bureau of Standards data to an interpretive technique developed by the USBR. Pit depth relations, illustrated by 2 formulas, have been established for a number of low-alloy ferrous materials. One fundamental development is a reliable method of averaging pit depth even where inspection time periods are different. Pitting ratios were determined for many ferrous products using steel as the reference standard. Conclusions were: (1)

Chemical and physical compositions affect corrosion of ferrous metals in soils, and this effect can be measured with surprising precision. (2) Gray cast iron, a heterogeneous material, is commercially manufactured in such greater thickness than steel that it will have a longer life even though its pitting rate is faster. (3) Ductile cast iron, made according to manufacturers' schedule, has about the same life as steel in severely corrosive soil, even though its pitting rate is greater than either steel or gray cast iron. (4) For wrought materials, the corrosivity constants for short and long terms are almost identical. (5) A 4-yr time test is as adequate for homogeneous materials as a longer one. (Author)

**AD-622 322** **See Fld. 20/12**

**AD-622 369** **See Fld. 20/12**

**AD-622 380** **See Fld. 20/3**

**AD-622 381** **See Fld. 20/12**

**AD-622 382** **See Fld. 20/12**

**AD-622 393** **See Fld. 20/12**

**AD-622 512** **See Fld. 20/2**

**AD-622 554** **See Fld. 13/13**

**AD-622 702** **See Fld. 20/12**

**AD-622 790** **See Fld. 18/8**

**AD-622 791** **See Fld. 18/8**

## 11/7. MISCELLANEOUS MATERIALS

**AD-622 347 Div. 14/6 ,31/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*DAVID TAYLOR MODEL BASIN WASHINGTON D C*
**AN EXPERIMENTAL INVESTIGATION OF PENETRATIONS AND CLOSURES FOR GLASS-REINFORCEDPLASTIC PRESSURE HULLS WITH TITANIUM JACKETS.**
Final rept.,
by John L. Proffitt. Sep 65, 28p. Rept. no. 2091
Proj. SF013 01 03 Task 0214
Unclassified report

Descriptors: (*Composite materials, Filament wound construction), (*Filament wound construction, Composite materials), (*Glass textiles, Reinforcing materials), (*Submarine hulls, Stiffened cylinders), (*Plastics, Composite materials), Titanium, Cylindrical shells, Rings,Penetration, Hydrostatic pressure, Model tests, Fatigue (Mechanics), Failure (Mechanics), Hemispherical shells, Feasibility studies

Four models were tested under hydrostatic pressure to determine the structural behavior of ring-stiffened glass-reinforced-plastic hulls with such structural details as small cylinder penetrations and end closures. Two models incorporated cylinder penetrations; two had hemispherical end closures, one each of titanium and GRP. The results of the tests indicate that such details might be used in composite GRP hulls without a severe weight penalty. However, fatigue tests of small-scale models and further static and cyclic investivations of large-scale and complete unit models are required to fully establish the feasibility of these structure for deepsubmergence applications. (Author)

**AD-622 435 Div. 14/6 ,4/3 ,12/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*DENVER RESEARCH INST COLO*
**FEASIBILITY INVESTIGATION OF VISCOUS SOLVENT REMOVAL OF TRACE CONTAMINANTS.**
Final rept. for 1 Mar 64-1 Mar 65,
by Thomas D. Nevens, John A. Krimmel, and David R.Jordan. Aug 65, 46p. Contract AF33 615 1463 Proj. 6373 Task 637302
AMRL , TR-65-100
Unclassified report

Descriptors: (*Spacecraft cabins, Decontamination), (*Controlled atmospheres, Decontamination), (*Organic solvents, Selection), Air pollution, Purification, Aliphatic compounds, Aromatic compounds, Halogenated hydrocarbons, Refrigerants, Alcohols, Aldehydes, Carboxylic acids, Ketones, Acetates, Ethers

Twenty-three compounds were studied as potential solvents for the removal of trace contaminants from the atmosphere of a space capsule. The contaminants to be removed included a wide variety of chemical types such as aliphatic (both saturated and unsaturated), alicyclic, and aromatic hydrocarbons, chlorinated hydrocarbons, Freons, alcohols, aldehydes, acids, ketones, acetates, ethers, and other miscellaneous compounds. In an effort to dissolve as many of the contaminants as possible, solvents which contained a number of different chemical structures were synthesized. Most of the solvents were esters derived from the reaction of a polyhydric alcohol such as pentaerythritol, trimethylolpropane, or isorbide with a mixture of organic acids. Esters of sebacic and isosebacic acids also were considered. The solubilities of representative contaminants in each of the solvents were determined. Calculations based on these data showed that the best solvent was much less efficient than charcoal for the removal of the contaminants. (Author)

**AD-622 445 Div. 14/6**
**CFSTI Prices: HC $3.00 MF $0.75**
*ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS*
**HIGH-COMPRESSIVE-STRENGTH CONCRETE.**
Rept. no. 3 (Final) for Jul 61-Jan 65,
by Kenneth L. Saucier, William O. Tynes, and Eugene F. Smith. Sep 65, 91p. Proj. 5710
AFWL , TR-65-16
Unclassified report

See also AD-433 651.

Descriptors: (*Concrete, Compressive properties), Performance (Engineering), Aging (Materials), Manufacturing methods, Structures, Thermal properties, Creep, Deformation, Reinforced concrete, Mathematical analysis, Stresses, Mixtures, Tensile properties

The information contained herein constitutes the third and final report on high-compressive-strength concrete. The first report consisted of a review of the state of the art. In phase two approximately 150 mixtures were proportioned to study the effect of mixture variables on the ultimate strength. In this report are presented the results of the previous two phases, and results of physical and thermal tests of highstrength concrete including creep, shrinkage, thermal properties, heat rise, and stress-strain relations. Procedures for proportioning, mixing, placing, using, testing, and inspecting high-strength concrete are discussed as well as the practical application of high-strength concrete to structural works. Recommendations are made for additional studies to fully utilize the properties of high-strength concrete. (Author)

**AD-622 780 Div. 14/6**
**CFSTI Prices: HC $2.00 MF $0.75**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**PHOTOELASTIC DETERMINATION OF STRAIN DISTRIBUTION IN CEMENT PASTE, MORTORS, AND CONCRETE.**
Final rept. for 1 Jul 64-1 Jun 65,
by John R. Keeton. Nov 65, 37p. Rept. no. TR-R-404
Proj. Y R011 01 01 079
Unclassified report

Descriptors: (*Concrete, Strain (Mechanics)), (*Cements, Strain (Mechanics)), Stresses, Mathematical analysis, Photoelasticity, Distribution, Sand

The photoelastic method of stress analysis by means of transparent plastic coatings was employed to study the effects of aggregate inclusions in prisms of hardened portland cement paste, Ottawa 20-30 sand mortar, Ottawa graded sand mortar, river sand mortar, and river gravel concrete. With hardened cement paste as the reference, momuniformity of maximum shear strain distribution was found to increase with the maximum size and with the range of gradation of the aggregate particles included in the cement paste. Comparative tests revealed that strain distribution is quite different between loaded and nonloaded hardened cement paste. In a preliminary test to determine the effects of constant sustained stresses upon creep in the photoelastic coating itself, the inherent creep characteristics of the plastic coating material used in the study were found to be negligible. (Author)

**AD-622 874 Div. 14/6 ,4/4**
**CFSTI Prices: HC $6.00 MF $1.25**
*LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF*
**METAL DIFFUSION IN PYROLYTIC GRAPHITE.**
Doctoral thesis,
by Martin Lewis Hammond. Jun 65, 207p.
Rept. no. 6-75-65-27
Unclassified report

Descriptors: (*Pyrolytic graphite, Absorption), (*Niobium, Diffusion), Radioactive isotopes, Rhenium, Metals, Heat of activation, Nucleation, Microstructure, Autoradiography, Mathematical analysis, Differential equations, Heat treatment, Crystal structure

The diffusion coefficients of Nb-95 in PG were measured between 1450 and 1950C in three different types of PG which were chosen to represent substrate nucleated, combination substrate and regeneratively nucleated, and regeneratively nucleated microstructures. The diffusion coefficients parallel and perpendicular to the deposition surface were determined in as-deposited and partially graphitized PG. Autoradiography was used to observe the distribution of diffusing atoms. The structure of the PG was characterized by the application of many techniques of metallography, x-ray diffraction, small angle scattering of x-rays, and density determinations. A mathematical analysis of diffusion in layered structures was made and correlations between the structure and diffusion parameters noted. The activation energies for Nb diffusion in PG depended only upon direction and were independent of microstructure and state of graphitization. The activation energy for Nb diffusion parallel to the deposition plane was 96.2 kcal/mole and that perpendicular to it was 73.1 kcal/mole. The preexponential factors for a given direction differed only slightly for the various PG's used in this study; these factors were altered by the graphitizing heat-treatment. (Author)

**AD-623 051 Div. 14/6 ,14/8 ,31/4**
**CFSTI Prices: HC $5.00 MF $1.00**
*DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF ADVANCE STRUCTURES AND MECHANICAL DEPT*
**STUDY OF RESIDUAL STRESSES IN THICK**

**GLASSFILAMENT-REINFORCED LAMINATES.**
Final rept. for 30 Jun 64-15 Oct 65,
by F. E. Stone. 15 Oct 65, 177p. Rept. no. SM-49252
Contract NObs90301 Proj. R007 03 04 Task 1008

Unclassified report

See also AD-612 951.

Descriptors: (*Laminated plastics, Filament wound construction), (*Composite materials, Filament wound construction), (*Submarine hulls, Filament wound construction), (*Filament wound construction, Composite materials), (*Glass textiles, Reinforcing materials), Stresses, Cylindrical bodies, Mathematical analysis, Structures, Rings, Winding, Bubbles, Tensile properties, Thickness, Temperature

A study was made to determine the presence, magnitude, causes, effects, and methods of controlling residual stresses in filament-reinforced plastic (FRP) structures for deep submergence application. Residual radial and hoop stresses are described for 18 cylinders of dispersed (4H:2L) construction and 46 all-hoop rings. Four methods of residual-stress analysis are reported and compared. Residual-stress trends are shown as a function of laminate thickness, radius, construction, winding tension, and mandrel temperature. The critical fabrication effects are identified, and the relative effects of most fabrication variables are compared. Residual-stress effects are examined with respect to interlaminar shear, compression, and buckling strength. Results indicate that residual axial and radial stresses are negligible for the thicknesses investigated and that the residual-stress effect on interlaminar shear strength, bending stiffness, and buckling strength is also negligible. Void content was found to affect laminate stiffness and have a pronounced effect on interlaminar shear strength--particularly on shear fatigue. (Author)

**AD-622 302** **See Fld. 11/6**

**AD-622 397** **See Fld. 20/12**

**AD-622 938** **See Fld. 9/5**

## 11/8. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

**AD-622 349 Div. 14/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**METHOD OF STABILIZING SILICONE OILS,**
by G. S. Tubyanskaya, and R. I. Kobzova. 21 Sep 65, 5p. Rept. no. FTD-TT-65-520
TT , 65-64140

Unclassified report

Unedited rough draft trans. of Russian Patent 162 268, Appl. no. 856107/23-4, 9 Sep 63.

Descriptors: (*Silicon compounds, Oils), (*Oils, Stabilization), (*Lubricant additives, Metalorganic compounds), Gels, Inhibition, Manganese compounds, Monocyclic compounds, Pyrolysis, Antioxidants, Patents, USSR

The object of the invention is a method of stabilization of silicone oils by means of the introduction of additives which has the distinguishing feature that, as an additive, cyclopentadienyl tricarbonyl manganese is introduced. (Author)

**AD-622 474 Div. 14/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**THERMAL STABILITY OF ANTIWEAR ADDITIVES IN LUBRICATING OILS,**
by A. M. Ravikovich, E. I. Petyakina, and P. P. Bagryantseva. 17 Sep 65, 10p. Rept. no. FTD-TT-65-867
TT , 65-64197

Unclassified report

Unedited rough draft trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) v9 n12 p44-7 1964.

Descriptors: (*Lubricant additives, Thermal properties), Stability, Wear resistance, Loading (Mechanics), Tests, Friction, USSR

**AD-622 942 Div. 14/5 ,10/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**CURRENT MATERIALS ON PROBLEMS OF LUBRICATION,**
by B. Nartsissov. 12 May 64, 4p. Rept. no. AID-U-64-36
TT , 65-64296

Unclassified report

Trans. of Azerbaidzhanskoe Neftyanoe Khozyaistvo (USSR) v43 n1 p36-8, 48; n2 p30-2 1964 and Neftekhimiya (USSR) v4 n1 p170-5 1964.

Descriptors: (*Lubricants, Reviews), (*Aviation fuels, Gas turbines), Additives, Oils, Lubrication, Thermal conductivity, Hydrocarbons, Siloxanes, Wear resistance, Energy, USSR

Abstracts are presented on four research papers: Obtaining of the malfunctional additive BFK on the industrial scale, on the conductivity of petroleum lubricant oils and their mixtures, Synergistic lubricating action of polysiloxanes and hydrocarbons, and energy characteristics of fuels for aircraft gas turbine engines (USSR).

**AD-622 355** **See Fld. 11/9**

**AD-622 559** **See Fld. 19/6**

## 11/9. PLASTICS

**AD-622 344 Div. 14/8 ,14/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**METHOD OF OBTAINING COMBINED MIXTURES OF POLYAMIDE AND POLYFORMALDEHYDE,**
by B. A. Egorov, A. V. Yudin, and V. M. Barboi. 21 Sep 65, 5p. Rept. no. FTD-TT-65-524
TT , 65-64136

Unclassified report

Unedited rough draft trans. of Russian Patent 166 829, appl. no. 825008/23-5, 14 Mar 63.

Descriptors: (*Polyamide plastics, Mixtures), (*Formaldehyde, Polymerization), Nylon, Polymers, Fibers (Synthetic), Films, Plastics, USSR, Patents

The object of the invention is a method for obtaining combined mixtures of polyamide with polyformaldehyde which as the distinguishing feature that, for the purpose of obtaining uniform mixtures, the polyformaldehyde is dissolved in the monomer of polyamide and then the polymer is subjected to polymerization. (Author)

**AD-622 351 Div. 14/8 ,4/3**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**CYCLOLINEAR POLYPHENYLSILOXANE,**
by S. A. Pavlova, V. I. Pakhomov, and I. I. Tverdokhlebova. 24 Sep 65, 9p. Rept. no. FTD-TT-65-871
TT , 65-64142

Unclassified report

Unedited rough draft trans. of Vysokomolekulyarnye Soedineniya (USSR) v6 n7 p1275-80 1964. Available only for reference use at DDC field services. Copy is not available for public sale.

Descriptors: (*Siloxanes, Chemical properties), (*Polymers, Siloxanes), Condensation reactions, Organic solvents, Molecular structure, Molecular weight, O-heterocyclic compounds, USSR

The properties and structures of four polyphenylsiloxane specimens were investigated. It was found that all of them have a cyclolinear structure, but differ in molecular weight characteristics. (Author)

**AD-622 355 Div. 14/8 ,14/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PLASTICS (SELECTED ARTICLES).**
30 Sep 65, 17p. Rept. no. FTD-TT-65-909
TT , 65-64145

Unclassified report

Unedited rough draft trans. of Plasticheskie Massy (USSR) n9 p18-20, 41-3 1964. Available copy will not permit fully legible reporduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Plastics, Material forming), (*Material forming, Lubricants), (*Siloxanes, Lubricants), (*Polyamide plastics, Low-temperature research), (*Friction, Polyamide plastics), USSR

Contents: Selection and application of silicone fluids to decrease the adhesion of plastics to solid surfaces, by L. M. Vinogradova, A. Ya. Korolev; The affect of low temperatures on the antifriction properties of polycaprolactam, by Yu. A. Yevdokimov, A. F. Kotenko, and M. S. Popov.

**AD-622 447 Div. 14/8 ,4/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**A METHOD OF OBTAINING SILICONE MONOMERS WITH A CYCLOPENTADIENE RADICAL,**
by M. K. Romantsevich, I. M. Shologon, N. F. Baranovskaya, N. N. Sirenko, and L. I. Kisina. 23 Sep 65, 6p. Rept. no. FTD-TT-65-432
TT , 65-64172

Unclassified report

Unedited rough draft trans. of Russian patent 165 721, appl. 784334/23-4, 27 Jun 62, 2p.

Descriptors: (*Silanes, Chemical reactions), (*Monocyclic compounds, Silanes), Halogen compounds, Chlorine compounds, Sodium compounds, Patents, USSR

The method of producing silicone monomers with a cyclopentadiene radical from sodium cyclopentadiene suspended in benzene and alkyl (aryl) haloid silanes is different in that alkyl (aryl) haloid silanes are added to a suspension of sodium cyclopentadiene in benzene at a temperature of minus 10-5C to increase the yield of usable products. (Author)

**AD-622 449 Div. 14/8 ,4/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**METHOD OF OBTAINING HALOGENATED TRICYCLIC ORGANOSILICON COMPOUNDS,**
by M. K. Romantsevich, I. M. Shologon, and L. I. Kisina. 21 Sep 65, 5p. Rept. no. FTD-TT-65-516
TT , 65-64174

Unclassified report

Unedited rough draft trans. of Russian patent 166 683, appl. 851138/23-4, 5 Aug 63, 1p.

Descriptors: (*Silanes, Synthesis (Chemistry)), Chlorine compounds, Polycyclic compounds, Condensation reactions, Heat-resistant plastics, Patents, USSR

The object of the invention is a method of obtaining halogenated tricyclic organosilicon compounds which has the distinguishing feature that for the purpose of expanding the raw-material base for the obtaining of heat-resistant polymers, cyclopentadienyl trichlorsilane or cyclopendadienyl alkyl (aryl) of haloid silane (see AD-622 447) is subjected to interaction with polyhalogen cyclopendadienes with heating in a medium of organic solution. (Author)

**AD-622 362** See Fld. 7/4

**AD-622 409** See Fld. 13/9

**AD-622 576** See Fld. 20/6

**AD-622 579** See Fld. 20/6

**AD-622 635** See Fld. 5/1

**AD-622 699** See Fld. 20/12

**AD-622 790** See Fld. 18/8

**AD-622 791** See Fld. 18/8

**AD-622 938** See Fld. 9/5

**AD-623 051** See Fld. 11/7

## 12/1. MATHEMATICS AND STATISTICS

**AD-622 377 Div. 15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**ASYMPTOTICS OF CERTAIN FUNCTIONALS IN BOUNDARY PROBLEMS OF A TWO-DIMENSIONAL RANDOM STRAYING,**
by V. S. Korolyuk. 24 Sep 65, 9p. Rept. no. FTD-TT-65-675
TT , 65-64159
Unclassified report

Unedited rough draft trans. of mono. Predelnye Teoremy Teorii Veroyatnostei, n.p. 1963 p43-8.

Descriptors: (*Stochastic processes, Boundary value problems), (*Functional analysis, Boundary value problems), (*Boundary value problems, Functional analysis), Boundary layer, USSR

In this report algorithms are formulated of asymptotic decompositions in boundary problems of two-dimensional radom straying, obtained by the method of analyzing equations for the sought for distributions, containing a small parameter.

**AD-622 458 Div. 15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PROPERTIES OF CERTAIN STRUCTURES OF MULTI VARIABLE SYSTEMS WITH CONTROLLING MODELS,**
by K. D. Zhuk. 17 Sep 65, 17p. Rept. no. FTD-TT-65-875
TT , 65-64183
Unclassified report

Unedited rough draft trans. of Avtomatyka (USSR) v9 n4 p3-9 1964.

Descriptors: (*Control systems, Synthesis), (*Analysis of variance, Control systems), Automatic, Invariance, Matrix algebra, Operators (Mathematics), Transformations (Mathematics), Stability, USSR

Problems of the synthesis of automatic multivariable systems (AMS) are considered on the basis of the conditions of autonomy and invariance. Using elements of the method of inverse operators, the AMS structures previously considered are analysed, and it is shown that the property of complete autonomy in control may be attained by a simple modelling of the links of the multivariable member without unlimitedly large coefficients of amplification or differentiating devices. A simple mathematical proof of this conclusion is given, and corroborated experimentally. In addition, it is shown that it is possible in some cases to construct invariant AMS without directly measuring all of some external perturbations, but using a reversible model of the member in the AMS. (Author)

**AD-622 491 Div. 15/1 ,25/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**IMPROVEMENT OF BOUNDS TO EIGENVALUES OF OPERATORS OF THE FORM T..T,**
by Norman W. Bazley, and David W. Fox. 26 Feb 64, 27p. Rept. no. CF-3067
Contract NOw62 0604c
Unclassified report

Descriptors: (*Operators (Mathematics), Boundary value problems), Vibration, Elastic shells, Rods, Elasticity, Matrix algebra, Optimization

For the eigenvalue problems that arise in the theory of vibration of continuous elastic systems, e.g. threedimensional solids, shells, plates, rods, bars, etc., it is useful to have auxiliary methods capable of improving and refining the rigorous upper and lower bounds that can be found by the Rayleigh-Ritz and comparison operator procedures. A method is presented which should be quite useful in problems of this kind.

**AD-622 500 Div. 15/2 ,33/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY*
**STATISTICAL EXPERIMENTS WITH A TWO-LANE FLOW MODEL.**
Research rept.,
by Robert M. Oliver, and Tenny Lam. Jul 65, 24p. Rept. no. ORC-65-20
Contract Nonr22283 ,Grant NSF GP2633 Proj. NR047 033
Unclassified report

Descriptors: (*Stochastic processes, Traffic), (*Traffic, Stochastic processes), Transportation, Model theory, Operations research, Trafficability

In this paper, the authors describe a series of experiments which have been used to evaluate a theoretical model of lane changing and passing maneuvers. The experiments were performed on two unideirectional lanes of a four-lane freeway. In the introductory sections there is a theoretical discussion of the lane-changing model. The third section of the paper describes the experiments and the measurements which were made. A fourth and fifth section report on the analysis of experimental data. Data obtained for the mean and variance of lane changing flow rates are compared with theoretical values computed from variance and covariance functions of lane flow rates and lane velocities. (Author)

**AD-622 501 Div. 15/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*OPERATIONS RESEARCH CENTER UNIV OF CALIF BERKELEY*
**DECOMPOSITION AND INTERCONNECTED SYSTEMS IN MATHEMATICAL PROGRAMMING.**
Research rept.,
by Paul Rech. Sep 65, 92p. Rept. no. ORC-65-31
Contract Nonr22283 ,DA31 134ARO D331 Proj. NR047 033
Unclassified report

Descriptors: (*Linear programming, Optimization), Mathematical programming, Matrix algebra

This thesis is concerned with the development of a decomposition method for solving large linear programming problems arising from N interconnected systems.

**AD-622 513 Div. 15/1**
**CFSTI Prices: HC $5.00 MF $1.00**
*CORNELL UNIV ITHACA N Y*
**AMPLITUDE-LIMITED CONTROL OF LINEAR, DISCRETE SYSTEMS WITH QUADRATIC ERROR MEASURE.**
Doctoral thesis,
by Philip Auten Reynolds. Sep 65, 153p.
Unclassified report

Descriptors: (*Optimization, Control systems), Linear systems, Errors, Measure theory, Design

The problem of finding a sequence of N amplitude-delimited controls which minimizes a quadratic error measure over N sampling intervals is studied. The error measure is the integral of a quadratic form in the state of the plant and the control variable. Conditions governing the uniqueness of the solution to the optimization problem are investigated. A new algorithm for solution of the problem is presented, and other methods of solution are discussed in the light of their possible use as part of a real-time controller. The algorithm is similar to the simplex algorithm of linear programming, but it solves the problem using fewer variables and equations. The logic involved in the algorithm is more complicated. Three controllers based on the N-stage optimization problem -- constant-N, periodic-N, and dual-mode -are studied. Necessary conditions for asymptotic stability in the large are stated for both the constant-N and the periodic-N controllers. These conditions are also sufficient for asymptotic stability in a restricted region of state space.

**AD-622 515 Div. 15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*CATHOLIC UNIV OF AMERICA WASHINGTON D C DEPT OF MATHEMATICS*
**ON CHARACTERIZATION OF EMBEDDINGS AND QUOTIENT MAPS IN CONCRETE CATEGORIES. PART ONE.**
Technical rept.,
by Isidore J. Heller. 4 Oct 65, 18p. Rept. no. TR-10465
Contract Nonr431100
Unclassified report

Descriptors: (*Mapping (Transformations), Algebra), (*Algebra, Mapping (Transformations)), Set theory

It is proved that, under specified conditions on a concrete category, a certain point-free formulation characterizes the embeddings and quotient maps. (Author)

**AD-622 523 Div. 15/1**
*CALIFORNIA UNIV LOS ANGELES*
**TCHEBYCHEFF APPROXIMATION AND RELATED EXTREMAL PROBLEMS,**
by E. W. Cheney, and A. A. Goldstein. 1964,

13p. Contract AF AFOSR62 348
AFOSR , 65-1163

Unclassified report

Pub. in Journal of Mathematics and Mechanics v14 n1 p87-98 Jan 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Texas Univ., Austin. Grant AF AFOSR77 63.

Descriptors: (*Complex variables, Functional analysis), (*Functional analysis, Complex variables), Convex sets, TPOPOLOGY, Theorems

**AD-622 528 Div. 15/1**
*WESTERN RESERVE UNIV CLEVELAND OHIO*
**MORSE THEORY AND LIAPUNOV FUNCTIONS,**
by Walter Leighton. Jun 64, 12p. Contract NSF G11741 ,DA ARO D31 124G197
AROD , 2828:4

Unclassified report

Pub. in Circolo Matematico, Palermo. Rendiconti s2 v13 p1-10 1964 (Copies available only to DDC users).

Descriptors: (*Trajectories, Calculus of variations), (*Differential equations, Trajectories), Functional analysis, Stability, Functions, Set theory, Integrals

When an autonomous system of differential equations dx/dt = f (x) (x = x sub i, x sub 2, . . . , x sub n has an isolated equilibrium point at (x) = (0) which is asymptotically stable, it is of interest to determine a region of attraction containing the equilibrium point; that is, a region R with the property that every half-trajectory which has a point in R when t =t sub 0 tends to the equilibrium point at the origin as t approaches infinity. It is shown how methods due to Morse can be used with great effectiveness in the determination of such regions of attraction. A new condition for global asymptotic stability of the equilibrium point then emerges in a natural fashion.

**AD-622 602 Div. 15/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*MARYLAND UNIV COLLEGE PARK*
**ON A MIXED BOUNDARY PROBLEM FOR AN ELLIPTIC SYSTEM OF EQUATIONS.**
Doctoral thesis,
by Jung S. Kim. 1961, 79p. Contract AF49 638 590
AFOSR , 3986

Unclassified report

Descriptors: (*Boundary value problems, Partial differential equations), (*Partial differential equations, Boundary value problems), Operators (Mathematics), Theorems

**AD-622 609 Div. 15/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*INFORMATION SYSTEMS LAB UNIV OF MICHIGAN ANN ARBOR*
**COVERING PROBLEMS: DUALITY RELATIONS AND A NEW METHOD OF SOLUTION.**
Technical rept.,
by Eugene L. Lawler. May 65, 33p. Rept. no. ISL-65-3
Contract AF30 602 3546 Grant ,NSF GP 2778

Unclassified report

Descriptors: (*Linear programming, Optimization), Matrix algebra, Combinatorial analysis, Vector analysis, Operations research, Set theory

This paper is concerned with 'covering' problems of the following type: Let a strictly positive n-vector c and an mxn matrix A of O's and 1's be given. Let epsilon = (1,1,...,1) be an m-vector of 1's. Find a solution vector y = (y1,y2,....,yn) which will minimize the inner product cy subject to Ay > or = epsilon and y sub j = O or 1 (j=1,2,...,n). There is an interesting duality between the constraints of covering problems and their solutions. This duality is explored in this paper and is found to furnish the basis for a possible new method of solution which is described in detail. (Author)

**AD-622 613 Div. 15/1 ,25/6**
*RIAS INC BALTIMORE MD*
**INTERNATIONAL SYMPOSIUM ON NONLINEAR DIFFERENTIAL EQUATIONS AND NONLINEAR MECHANICS,**
by Joseph P. LaSalle, and Solomon Lefschetz.
1963, 518p. Contract AF49 638 930
AFOSR , 4481

Unclassified report

Available from Academic Press, New York and London.

Descriptors: (*Symposia, Nonlinear differential equations), (*Nonlinear differential equations, Symposia), (*Mechanics, Symposia), Nonlinear systems, Control systems, Dynamics

This volume is the proceedings of a Symposium which brought together a group of pure and applied mathematicians interested in nonlinear differential equations, nonlinear mechanics, control theory, and other related topics. The contents shows that the range covered by the Symposium was very large indeed. Invited addresses, contained in the volume, were given by L. Markus, G. Reeb, R. Reissig, and Yu A. Mitropolskii. A major part of the meeting centered around the following very active round table discussions: 'Oscillations and Asymptotic Behavior.' Chairman: Jack K. Hale, RIAS. 'Applications of Differential Equations.' Chairman: Richard Bellman, the RAND Corporation. 'Control and Stability.' Chairman: R. E. Kalman, RIAS. 'Qualitative Theory.' Chairman: Shlomo Sternberg, Harvard University. The Symposium, officially known as the 1961 International Symposium on Nonlinear Differential Equations and Nonlinear Mechanics, was held 31 July through 4 August at the United States Air Force Academy, Colorado Springs, Colorado, and was sponsored by the Air Force Office of Scientific Research and RIAS (Research Institute for Advanced Study.)

**AD-622 638 Div. 15/1**
*ILLINOIS UNIV URBANA*
**A COMPLEX-VARIABLES PROOF Or HOLDER'S INEQUALITY,**
by L. A. Rubel. 4 Mar 64, 2p. Contract AF AFOSR460 63
AFOSR , 65-1409

Unclassified report

Pub. in Proceedings of the Americal Mathematical Society v15 n6 p999 Dec 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Inequalities, Complex variables), (*Complex variables, Inequalities), Measure theory, Functional analysis

**AD-622 651 Div. 15/1**
*STANFORD UNIV CALIF DEPT OF MATHEMATICS*
**ON HYPERBOLIC MIXED PROBLEMS,**
by Leonard Sarason. 18 Sep 64, 26p. Contract AF49 638 1345
AFOSR , 65-1397

Unclassified report

Pub. in Archive for Rational Mechanics and Analysis v18 n4 p310-34 1965 (Copies available only to DDC users).

Descriptors: (*Boundary value problems, Partial differential equations), (*Partial differential equations, Boundary value problems), Operators (Mathematics), Integral transforms

**AD-622 659 Div. 15/1**
*BOSTON UNIV MASS*
**SYMBOLIC CALCULUS OF THE WIENER PROCESS AND WIENER-HERMITE FUNCTIONALS,**
by Tsutomu Imamura, William C. Meecham, and Armand Siegel. 13 Dec 63, 12p. Contract AF AFOSR62 177

Unclassified report

Pub. in Journal of Mathematical Physics v6 n5 p695706 May 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Minnesota Univ., Minneapolis.

Descriptors: (*Series, Calculus of variations), (*Functions, Series), Probability, Operators (Mathematics), Integrals, Vector analysis, Distribution theory, Turbulence

A new definition is given for the 'ideal random function' (derivative of the Wiener function), which separates out infinite factors by fullest exploitation of the possibilities of the Dirac delta function. By allowing all integrals to be written formally as sums, this facilitates the definition and manipulation of the Wiener-Hermite functionals, especially for vector random processes of multiple argument. Expansion of a random function in WienerHermite functionals is discussed. An expression is derived for the expectation value of the product of any number of Wiener-Hermite functionals; this is all that is needed in principle to obtain full statistical information from the Wiener-Hermite functional expansion of a random function. The method is illustrated by the calculation of the first correction to the flatness factor (measure of Gaussianity) of a nearly-Gaussian random function. (Author)

**AD-622 668 Div. 15/1 ,25/5**
*TORINO UNIV (ITALY) ISTITUTO DI FISICA*
**ON THE PROPERTIES OF LANDAU CURVES,**
by T. Regge, and G. Barucchi. 21 Mar 64, 37p. Contract AF EOAR62 101
AFOSR , 65-1353

Unclassified report

Pub. in Il Nuovo Cimento v34 n10 p106-40 Oct 1 1964 (Copies available only to DDC users). Prepared in cooperation with Inst. for Advanced Study, Princeton, N. J.

Descriptors: (*Algebraic geometry, Locus), (*Locus, Algebraic geometry), Determinants, Graphics, Perturbation theory, Quantum mechanics

A derivation of several properties of Landau curves is carried out with the methods of algebraic geometry. In particular formulas have been established for the Plucker characteristics of large classes of Landau curves. A determinantal formalism by Cayley has been shown to be particularly useful in connection with the present theory. (Author)

**AD-622 677 Div. 15/1**
*KANSAS UNIV LAWRENCE*
**ON RESTRICTIONS OF FUNCTIONS IN THE SPACES P (A,P) AND B (A,P),**
by P. Szeptycki. 13 Mar 64, 7p. Contract Nonr58313 Grant ,NSF GP439

Unclassified report

Pub. in Proceedings of the American Mathematical Society v16 n3 p341-7 Jun 1965 (Copies not available to DDC or Clearinghouse customers). Prepared for presentation to the American Mathematical Society, 23 Jan 1964. See also AD-605 333.

Descriptors: (*Potential theory, Bessel functions), (*Functional analysis, Potential theory), Integral transforms, Operators (Mathematics), Inequalities

**AD-622 741 Div. 15/1**
*HEBREW UNIV JERUSALEM (ISRAEL)*
**SELF-CIRCUMFERENCE OF CONVEX SETS,**
by B. Grunbaum. 1964, 3p. Contract AF EOAR63 63
AFOSR , 65-1401

Unclassified report

Pub. in Colloquium Mathematicum v13 n1 p55-7 1964 (Copies available only to DDC users).

Descriptors: (*Convex sets, Geometry), Functional analysis, Differential geometry, Topology, Israel

**AD-622 750 Div. 15/1**
*INSTITUTE FOR ADVANCED STUDY PRINCETON N J*
**CHARACTERIZATIONS OF TAME SURFACES IN E3,**
by C. E. Burgess. 1 Aug 63, 20p. Contract AF49 638 253
AFOSR , 65-1396

Unclassified report

Pub. in Transactions of the American Mathematical Society v114 n1 p80-97 Jan 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Utah Univ., Salt Lake City.

Descriptors: (*Topology, Surfaces), Algebraic topology, Set theory, Spheres, Disks, Mapping (Transformations)

It is shown that a connected 2-manifold K is tame in E3 if it can be locally spanned, with a disk, at each point from each side of K. This is then generalized to a 2manifold in a 3-manifold.

**AD-622 767 Div. 15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**COMPUTATIONAL EXPERIENCE WITH THE BALAS INTEGER PROGRAMMING ALGORITHM,**
by Raoul J. Freeman. Oct 65, 13p. Rept. no. P-3241

Unclassified report

Descriptors: (*Linear programming, Optimization), (*Programming (Computers), Linear programming), Combinatorial analysis

A recent and significant addition to the literature of partial enumeration methods of solving integer linear programming problems has been the algorithm of Balas (E. Balas. An additive algorithm for solving linear programs with zero-one variables. Operations Research, v.13:517-546 (July-Aug 1965). Building upon the foundation laid by Balas and (F. Glover. A multiphase-dual algorithm for the zero-one integer programming problem. Management Sciences Research Rept. no. 25, Dec 64, Graduate School of Industrial Administration, Carnegie Institute of Technology), a version of this algorithm was outlined in (A. Geoffrion. A reformulation of Balas' algorithm for integer linear programming. Rand Corp., RM-4783-PR, Sep 1965) that especially lends itself to computer implementation. This has since been programmed, and the purpose of this report is to describe some computational experience with the algorithm and to discuss future avenues of research that may be undertaken.

**AD-622 776 Div. 15/2 ,28/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL SCHOOL OF AVIATION MEDICINE PENSACOLA FLA*
**THE K-COEFFICIENT, A PEARSON-TYPE SUBSTITUTE FOR THE CONTINGENCY COEFFICIENT.**
Research rept.,
by Robert J. Wherry,Jr., and Norman E. Lane.
28 May 65, 20p. Rept. no. NSAM-929
NAVMED , MR095.13-3003.1-43

Unclassified report

Descriptors: (*Factor analysis, Statistical functions), (*Correlation techniques, Factor analysis), Psychometrics

The Pearson product-moment correlation coefficient is recognized as the basic equation for relationship. Well-known and widely used derivatives of the Pearson equation include the point-biserial correlation, the Spearman rank-difference correlation, the fourfold point correlation, and the correlation ratio. Expression of relationships between categorical variables has previously been possible only by means of the contingency coefficient. This paper describes an extension of Pearson's basic equation to provide a measure of relationship between two categorical variables, the 'K' coefficient, which avoids many of the disadvantages inherent in the contingency coefficient. (Author)

**AD-622 789 Div. 15/2**
**CFSTI Prices: HC $3.00 MF $0.50**
*AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH WRIGHT-PATTERSON AFB OHIO*
**PERCENTAGE POINTS OF THE MULTIVARIATE T DISTRIBUTION,**
by P. R. Krishnaiah, and J. V. Armitage. Oct 65, 55p. Rept. no. ARL-65-199
Proj. 7071 Task 707101

Unclassified report

Descriptors: (*Statistical distributions, Tables), Statistical analysis, Statistical tests, Probability, Numerical analysis

The multivariate t distribution plays an important role in the application of the Simultaneous Test Procedures and Ranking and Selection Procedures. This distribution was considered by several authors in the past. In this paper, the authors give very extensive tables of the percentage points of this distribution. Some applications of these tables are also discussed.

**AD-622 836 Div. 15/1**
*TEXAS UNIV AUSTIN*
**MINIMAX THEOREMS AND CONJUGATE SADDLEFUNCTIONS,**
by R. T. Rockafellar. 29 Apr 64, 24p. Contract AF AFOSR467 63
AFOSR , 65-1164

Unclassified report

Pub. in Mathematica Scandinavica v14 p151-73 1964 (Copies available only to DDC users).

Descriptors: (*Game theory, Nonlinear programming), (*Nonlinear programming, Game theory), Functions, Convex sets, Theorems

**AD-622 839 Div. 15/1**
*MINNESOTA UNIV MINNEAPOLIS DEPT OF MATHEMATICS*
**TRANSMISSION PROBLEMS FOR HOLOMORPHIC FIBER BUNDLES,**
by H. Rohrl. 15 Jun 64, 33p. Contract AF AFOSR625 65
AFOSR , 65-1414

Unclassified report

Excerpts from Proceedings of the Conference on Complex Analysis p215-43, Minneapolis 1964 (Copies available to DDC users). Prepared in cooperation with California Univ., San Diego. Dept. of Mathematics.

Descriptors: (*Algebraic topology, Functions), (*Complex variables, Algebraic topology), (*Functions, Algebraic topology), Boundary value problems

Transmission problems for holomorphic fiber bundles in high-dimensional complex spaces are considered. Topological preparations pertaining to the notion of boundary values on a hypersurface by approach from various sides are first carried out. Certain analytic preparations are made, which are mainly concerned with holomorphic bundles of complex Lie groups acting on holomorphic fiber bundles. The transmission problems are then stated. To each holomorphically correct transmission function, a holomorphic fiber bundle is constructed such that the set of solutions of the transmission problem corresponds bijectively to the set of holomorphic section in the fiber bundle. Topologically correct transmission functions are discussed and related to homology theory. Holomorphically correct transmission functions are then considered.

**AD-622 856 Div. 15/1**
*MANITOBA UNIV WINNIPEG*
**THE STRUCTURE OF POWERS OF NON-NEGATIVE MATRICES,**
by A. L. Dulmage, and N. S. Mendelsohn. 17 Mar 64, 16p. Contract AF AFOSR235 62 Proj. 9749 Task 974902
AFOSR , 65-1405

Unclassified report

Pub. in The Canadian Journal of Mathematics v17 p318-30 1965 (Copies available only to DDC users).

Descriptors: (*Matrix algebra, Combinatorial analysis), Graphics, Sequences, Number theory, Canada

The structure of powers of a reducible non-negative matrix is discussed in terms of properties of the directed graph of the matrix. The constituents of a reducible matrix are irreducible, and the structure of powers of irreducible matrices has been considered. There is a discussion of the structure of the subdiagonal blocks in powers of reducible matrices.

**AD-622 885 Div. 15/2**
*MICHIGAN STATE UNIV EAST LANSING*
**ON A CHARACTERIZATION OF THE POISSON DISTRIBUTION,**
by C. Radhakrishna Rao, and Herman Rubin.
Sep 64, 4p. Contract Nonr258702

Unclassified report

Pub. in Sankhya: The Indian Journal of Statistics Series A v26 pts 2 and 3 p295-8 1964. (Copies available only to DDC users).

Descriptors: (*Statistical distributions, Theorems), Probability, Binomials, Stochastic processes, Model theory

The paper considers a special model where an original observation from a discrete distribution is subject to damage according to binomial probability law. Based on such a model for the resulting observation a characterization of the Poisson distribution is obtained. (Author)

**AD-622 913 Div. 15/1**
*HEBREW UNIV JERUSALEM (ISRAEL)*
**GENERALIZED POLYNOMIAL IDENTITIES AND PIVOTAL MONOMIALS,**
by S. A. Amitsur. 1 Aug 63, 17p. Contract AF EOAR63 70
AFOSR , 65-1402

Unclassified report

Pub. in Proceedings of the American Mathematical Society v114 n1 11 p210-26 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Identities, Polynomials), Algebra, Transformations (Mathematics), Rings

The theorem which states that a primitive ring satisfying a polynomial identity of degree d is a finitedimensional algebra over its center, and of dimension 1 or = (d/2) squared, is extended to a more general type of polynomial relation.

**AD-622 914 Div. 15/1 ,25/5**
*TORINO UNIV (ITALY) ISTITUTO DI FISICA*
**ON THE GREEN'S FUNCTIONS ASSOCIATED TO THE WIGNER'S LITTLE GROUP,**
by A. Giovannini, and M. Verde. 15 Jun 64, 8p.
Contract AF EOAR62 101 ,AF EOAR64 39
AFOSR , 65-1352
Unclassified report

Pub. in IL Nuovo Cimento v34 (S) 10 p1306-13 Dec 1 1964 (Copies available only to DDC users).

Descriptors: (*Green's function, Groups (Mathematics)), (*Groups (Mathematics), Green's function), Quantum mechanics, Functional analysis, Operators (Mathematics)

The irreducible unitary representations of the Wigner's little groups, excluding the homogeneous Lorentz group in four dimensions, have been investigated wiht the method of the Green's function. (Author)

**AD-622 975 Div. 15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL ORDNANCE LAB WHITE OAK MD*
**REPRESENTATIONS INVOLVING CONTINUED FRACTIONS FOR THE RECIPROCALS OF SOME HYPERGEOMETRIC FUNCTIONS,**
by Joseph H. Eberly. 19 Aug 65, 13p. Rept. no. NOLTR-65-151
Proj. R360FR105RC11 01 01
Unclassified report

Descriptors: (*Continued fractions, Special functions (Mathematical)), (*Special functions (Mathematical), Continued fractions), (*Bessel functions, Continued fractions), Transcendental functions

A new class of representations of some of the more common higher transcendental functions is developed. These representations involve continued fractions in a compact way, and consequently may find use in highspeed digital computer routines designed to compute these functions numerically. Several examples are given for Bessel functions and the general confluent, hypergeometric function. (Author)

**AD-622 993 Div. 15/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF STATISTICS*
**THE ANALYSIS OF CIRCULAR DISTRIBUTIONS.**
Technical rept.,
by M. A. Stephens. Aug 65, 29p. Rept. no. TR-26
Contract Nonr401009 Proj. NR042 232
Unclassified report

Descriptors: (*Statistical distributions, Rings), Distribution theory, Statistical analysis, Statistical tests, Vector analysis

The paper shows how to estimate parameters, and test hypotheses, connected with two distributions which arise for observations on a circle. (Author)

**AD-622 994 Div. 15/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF STATISTICS*
**PERCENTAGE POINTS OF STATISTICS FOR TESTING RANDOMNESS OF DIRECTIONS.**
Technical rept.,
by M. A. Stephens. Jun 65, 11p. Rept. no. TR-27
Contract Nonr401009 Proj. NR042 232
Unclassified report

Descriptors: (*Statistical tests, Monte Carlo method), (*Monte Carlo method, Statistical tests), Statistical distributions, Probability, Direction finding, Vector analysis

The paper gives the percentage points of two statistics which would be used in testing for randomness of three dimensional vectors against one of two specified spherical distributions as alternative. (Author)

**AD-622 995 Div. 15/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF STATISTICS*
**TESTS FOR THE DISPERSION, AND FOR THE MODAL VECTOR OF A UNIMODAL DISTRIBUTION ON A SPHERE.**
Technical rept.,
by M. A. Stephens. Aug 65, 37p. Rept. no. TR-31
Contract Nonr401009 Proj. NR042 232
Unclassified report

Descriptors: (*Statistical tests, Distribution theory), (*Distribution theory, Spheres), Statistical distributions, Vector analysis, Recursive functions

The theory and tables are given for testing hypothesis concerning the parameters of the unimodal Fisher spherical distribution. (Author)

**AD-622 996 Div. 15/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF STATISTICS*
**A NOTE ON THE ESTIMATION OF THE LOCATION PARAMETER OF THE CAUCHY DISTRIBUTION.**
Technical rept.,
by Daniel Bloch. Oct 65, 9p. Rept. no. TR-33
Contract Nonr401009 Proj. NR042 232
Unclassified report

Descriptors: (*Statistical distributions, Statistical analysis), Distribution theory

In this paper the author discusses an estimator of the mean of the Cauchy distribution which is a weighted average of a new order statistics. (Author)

**AD-622 997 Div. 15/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF STATISTICS*
**SOME BAYESIAN METHODS RELATED TO CHI-SQUARE.**
Technical rept.,
by G. S. Watson. Sep 65, 23p. Rept. no. TR-34
Contract Nonr401009 Proj. NR042 232
Unclassified report

Descriptors: (*Statistical tests, Decision theory), Sampling, Probability, Distribution theory, Analysis of variance, Monte Carlo method

Monte-Carlo studies are made to determine when the chi-square statistic (using the sample or a modified sample) leads to an accurate Bayesian confidence region for the class probabilities in a multinomial - accurate only in the sense of posterior probability content, not shape. The exact distribution of the likelihood ratio statistic is given so that regions, exact in shape and content, can be obtained. Special methods for cases where there are mixed-up and missing classes are also given. (Author)

**AD-623 021 Div. 15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*CALIFORNIA UNIV BERKELEY*
**ON THE LYAPOUNOV CENTER THEOREM,**
by Al Kelley Jr.. 7 Oct 65, 12p. Contract Nonr22288 Proj. 041255
Unclassified report

Descriptors: (*Hamiltonian, Theorems), (*Theorems, Hamiltonian), Functions, Differential geometry, Vector analysis, Real variables, Stability

Lyapounov proved there exists a 1-parameter family y periodic orbits for certain analytic Hamiltonian systems. The question of the differentiability of the resulting manifold of periodic selections was not considered. C. L. Siegel proved the analyticity of the resulting manifold. The results given in the present work settle the problem of existence and smoothness of the manifold for non-analytic systems. (Author)

**AD-623 023 Div. 15/2 ,28/4 ,32/2 ,32/9**
**CFSTI Prices: HC $1.00 MF $0.50**
*QUEENS COLL OF THE CITY UNIV OF NEW YORK FLUSHING*
**NON-LINEAR FACTORS IN EMPIRICAL DATA,**
by W. A. Gibson. 1965, 18p. Contract Nonr G00033 63
Unclassified report

Descriptors: (*Factor analysis, Statistical data), (*Correlation techniques, Factor analysis), Psychometrics, Sociometrics, Anthropometry, Nonlinear systems, Effectiveness

Five empirical correlation matrices having simplex form, and all requiring no less than two linear common factors to explain them, are each supplied with an alternative nonlinear explanation. For each a single underlying continuum or factor is postulated, the empirical variables being non-linearly but essentially monotonically related thereto. Psychological, anthropometric, or sociological plausibility of these non-linear descriptions is good. The aim was to suggest that non-linearities may occur in real data and that methods for their analysis must be considered. There is no advocacy of abolition of linear methods where these suffice. The non-linear approach discussed here is intended as an addition to, not a substraction from, the scientifically parsimonious linear methods that have served us so well for so long. (Author)

**AD-623 027 Div. 15/2 ,2/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*BROWN UNIV PROVIDENCE R I*
**EXTENSIONS TO THEORY OF TIME-SERIES ANALYSIS.**
Final rept. for 1 Aug 62-31 Jul 65,
by Walter Freiberger. 31 Jul 65, 7p. Contract DA36 039sc87222 Proj. DA3A99 25 002
Unclassified report

See also AD-616 324.

Descriptors: (*Statistical analysis, Weather forecasting), (*Weather forecasting, Stochastic processes), Series, Mathematical models, Meteorological parameters

**AD-623 043 Div. 15/2 ,2/5**
*JOHNS HOPKINS UNIV BALTIMORE MD*
**EQUATORIAL DISTRIBUTIONS ON A SPHERE,**
by G. S. Watson. 1965, 9p.
Unclassified report

Pub. in Biometrika v52 n1 and 2 p193-201 1965 (Copies available only to DDC users).

Descriptors: (*Distribution theory, Spheres), (*Folds (Geology), Distribution theory), Probability, Statistical tests, Analysis of variance, Monte Carlo method

**AD-623 052 Div. 15/2**
*JOHNS HOPKINS UNIV BALTIMORE MD*
**ASYMPTOTICALLY MOST POWERFUL RANK TESTS FOR THE TWO-SAMPLE PROBLEM WITH CENSORED DATA.**
Revised ed.,
by Joseph L. Gastwirth. 18 Mar 65, 6p. Contract Nonr401009
Unclassified report

Pub. in the Annals of Mathematical Statistics, v36 n4 p1243-7 Aug 1965. (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 14 Dec 64. See also PB-148 911, AD-414 707.

Descriptors: (*Statistical tests, Monte Carlo method), (*Monte Carlo method, Statistical tests), Sampling, Statistical functions, Statistical analysis

Although the theory of asymptotically most powerful rank tests (A.M.p.y.t.) is fairly well developed, only little attention has been paid to censored data. In this paper, the author derives the a.m.p.r.t. for censored data from the a.m.p.r.t. based on the complete sample. For simplicity, he considers the twosample location problem for data censored on the right. The methods used, however, can be applied to find the a.m.p.r.t. for multicensored data and also the a.m.p.r.t. for the twosample dispersion problem when the data are censored.

**AD-623 065 Div. 15/2**
*JOHNS HOPKINS UNIV BALTIMORE MD*
**HAZARD ANALYSIS II,**
by G. S. Watson, and M. R. Leadbetter. Apr 64, 16p.

Unclassified report

Pub. in Sankhya: The Indian Journal of Statistics, v26 (SA) pt1 p101-16 1964 (Copies available only to DDC users). Prepared in cooperation with Research Triangle Inst., Durham, N. C. Sponsored by Office of Naval Research. See also AD-298 306 and AD-617 804.

Descriptors: (*Hazards, Statistical analysis), Numerical analysis, Curve fitting, Reliability, Probability, Distribution theory, Monte Carlo method

Theorems on the asymptotic behaviour of certain smoothed estimates of the probability density f (x), of the distribution function F (x), and of the hazard function h (x)... f (x)/ (1 - F (x)) are obtained, completing work begun in two earlier papers. A monte-carlo experiment suggest that the asymptotic results will often be adequate in practice. (Author)

**AD-623 068 Div. 15/1 ,30/2**
*GENERAL ELECTRIC CO PHOENIX ARIZ COMPUTER LAB*
**KLEENE QUOTIENT THEOREMS,**
by J. D. McKnight Jr., 18 Oct 63, 13p. Contract AF49 638 1215 Proj. 9749 Task 974901 AFOSR , 65-1165

Unclassified report

Pub. in Pacific Journal of Mathematics v14 n4 p1343-52 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Automata, Theorems), Groups (Mathematics), Set theory, Transformations (Mathematics), Algebra

Generalizations are presented of the Kleene quotient theorem and the Converse theorems dealing with the properties of semigroups. The Kleene quotient theorem is generalized by removing the restriction that the semigroup be free. It then states that every element of a finite quotient of a finitely generated semigroup is a regular subset of the semigroup. The Converse theorems are altered by removing the restriction that the free semigroup be finitely generated. A new method of proof of the theorems is presented which is thought to be more transparent than the method of Kleene. In this method, transformation semigroups are avoided in the proofs of the Converse theorems by introducing a class of refinements of quotients. From this method, a finite automation is defined. (Author)

**AD-623 069 Div. 15/2**
*JOHNS HOPKINS UNIV BALTIMORE MD*
**CORRECTIONS FOR SMOOTHING,**
by Geoffrey S. Watson. Sep 64, 2p. Contract Nonr401009

Unclassified report

Pub. in Sankhya: The Indian Journal of Statistics v26 (SA) pt4 p383-4 (Copies available only to DDC users).

Descriptors: (*Numerical analysis, Corrections), Statistical analysis, Curve fitting, Sampling, Integration

Some analogies between corrections for grouping and smoothing are noted. (Author)

**AD-623 070 Div. 15/2**
*JOHNS HOPKINS UNIV BALTIMORE MD*
**A NOTE ON MAXIMUM LIKELIHOOD,**
by G. S. Watson. Jun 63, 4p. Contract Nonr401009

Unclassified report

Pub. in Sankhya: The Indian Journal of Statistics v26 (SA) pts2, 3 p30-4 1964 (Copies available only to DDC users).

Descriptors: (*Mathematical prediction, S-matrix), (*S-matrix, Mathematical prediction), (*Statistical analysis, Matrix algebra), Inequalities

An inequality derived by elementary matrix algebra, is applied to show that the maximum likelihood estimation is a dispersion matrix. A comment is made on the use of instrumental variables. (Author)

**AD-622 358** **See Fld. 20/13**

**AD-622 410** **See Fld. 9/4**

**AD-622 413** **See Fld. 9/2**

**AD-622 482** **See Fld. 20/12**

**AD-622 525** **See Fld. 20/12**

**AD-622 584** **See Fld. 20/8**

**AD-622 652** **See Fld. 20/3**

**AD-622 660** **See Fld. 20/4**

**AD-622 663** **See Fld. 20/6**

**AD-622 675** **See Fld. 9/2**

**AD-622 736** **See Fld. 20/10**

**AD-622 764** **See Fld. 9/2**

**AD-622 826** **See Fld. 13/8**

**AD-622 828** **See Fld. 13/8**

**AD-622 832** **See Fld. 14/2**

**AD-622 833** **See Fld. 8/6**

**AD-622 867** **See Fld. 17/9**

**AD-622 869** **See Fld. 13/8**

**AD-622 870** **See Fld. 14/2**

**AD-622 872** **See Fld. 13/8**

**AD-622 985** **See Fld. 3/1**

**AD-622 991** **See Fld. 22**

**AD-623 001** **See Fld. 9/2**

**AD-623 002** **See Fld. 5/7**

**AD-623 044** **See Fld. 9/4**

**AD-623 053** **See Fld. 9/1**

**AD-623 067** **See Fld. 9/1**

## 13/1. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

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**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**STRUCTURE, PARAMETERS AND INTERACTION OF SUPERSONIC JETS IN CONTEMPORARY VACUUM PUMPS,**
by S. I. Kosterin, and N. I. Yushchenkova. 7 Oct 65, 23p. Rept. no. FTD-MT-65-206 TT , 65-64248

Unclassified report

Edited machine trans. of Teplo- i Massoperenos (USSR) v3 1963. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Vacuum pumps, Supersonic flow), (*Jets, Vacuum pumps), Nozzle gas flow, Axially symmetric flow, Vacuum, USSR

Influence of rarefaction of the medium (flow of air and vapor of vacuum oil) on the magnitude and distribution of parameters at the section of an axially symmetric nozzle with strong expansion was investigated. As a result of the investigation there is shown the dependence of diameter of isentropic flow core on degree of rarefaction of the medium and decrease of real Mach number M as compared to its value M sub id calculated without taking into account the influence of viscosity. Supersonic discharge of vapor and air from an axially symmetric nozzle into strongly rarefied medium under off-design conditions of discharge (underexpansion) was investigated. Investigation make it possible to obtain experimental data on the distribution of gas-dynamic parameters in the jet, and also to estimate the extent of the initial section of the stream for different values of deviation from design conditions. Interaction of two steam jets in a vacuum during discharge from two plane slot nozzles was investigated. In this part of the investigation determination is made of the change in structure of the jet during discharge from a system of nozzles as compared to that of a single jet, and there are given experimental data on distribution of parameters in the zone of interaction of two vapor jets.

## 13/2. CIVIL ENGINEERING

**AD-622 557 Div. 13/3 ,4/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**WASTE-HEAT SEAWATER CONVERSION UNIT AT MARCUS ISLAND.**

Final technical rept. for Nov 62-May 65,
by J. S. Williams. Sep 65, 19p. Rept. no. TR-R-407
Proj. Y F015 99 01 069
Unclassified report

Descriptors: (*Desalination, Evaporators), (*Water supplies, Sea water), (*Sea water, Desalination), (*Evaporators, Desalination), Distilling plants, Diesel engines, Exhaust gases, Heat, Feed water, Coast Guard research, Mechanical engineering

An in-service test of a developmental multistage flash evaporator utilizing rejected heat from a diesel generator is described. Some background information is given, as well as test results covering a 20-month period. It is concluded that the system furnishes a very satisfactory means of providing potable water from a seawater source. The importance of proper installation is also pointed out. (Author)

**AD-622 429** **See Fld. 8/6**

**AD-622 500** **See Fld. 12/1**

**AD-622 729** **See Fld. 7/1**

## 13/6. GROUND TRANSPORTATION EQUIPMENT

**AD-622 430** **See Fld. 20/2**

## 13/7. HYDRAULIC AND PNEUMATIC EQUIPMENT

**AD-622 348 Div. 26/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**A PNEUMATIC OR HYDRAULIC SYSTEM OF OPERATION AND CONTROL.**
21 Sep 65, 4p. Rept. no. FTD-TT-65-468
TT, 65-64139
Unclassified report

Unedited rough draft trans. of Russian Patent 124 719, appl. no. 625144/26, 13 Apr 59.

Descriptors: (*Pneumatic systems, Patents), (*Hydraulic systems, Patents), Operation, Control systems, USSR, Jets, Design

The object of the invention is a pneumatic or hydraulic system of operation and control, based on the interaction of jets and having linkages, which is accomplished in the form of notches and through gaps in the plates which are clamped together. For the purpose of simplifying its design and production, all of the remaining elements of the system (for example, chamber nozzles, throttle resistors, and etc.) are made in the form of notches and through gaps in the plates. (Author)

**AD-622 460 Div. 26/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**CRITERIA OF SIMILARITY IN CENTRIFUGAL PUMPS,**
by E. A. Vasiltsov. 30 Sep 65, 15p. Rept. no. FTD-TT-65-911
TT, 65-64185
Unclassified report

Unedited rough draft trans. of Energomashinostroenie (USSR) v10 n10 p12-4 1964.

Descriptors: (*Centrifugal pumps, Performance (Engineering)), Mathematical analysis, Pressure, USSR

A conclusion concerning the criteria of similarity in centrifugal machines is examined. The connection between these criteria and the high-speed factor is proven. Empirical dependences of the criteria of pressure and output depending on the high-speed factor are introduced. (Author)

## 13/8. INDUSTRIAL PROCESSES

**AD-622 428 Div. 26/4 ,12/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF*
**EX POST FACTO RELIABILITY CONSIDERATIONS.**
Final rept.,
by Herbert H. Blackschleger. Oct 65, 17p.
Rept. no. NOTS-TP-3716
Unclassified report

Descriptors: (*Guided missiles, Reliability), (*Quality control, Guided missiles), Guided missiles components, Costs, Production, Mathematical prediction, Production control

This report describes the basic considerations of an effective and comparatively low-cost reliability program for an exemplary airborne missile. It covers cases where expediency precludes full reliability considerations prior to production go-ahead and where the manufacturer has accepted a contractual requirement to demonstrate reliability at the systems level. It apportions reliability requirements, delineates important procedures that will provide worthwhile reliability assurance at reasonable cost, and fits the program into the quality assurance provisions of a typical manufacturer oriented to military contracts. The program is intended for missiles that are produced in small quantities. (Author)

**AD-622 814 Div. 26/1**
**CFSTI Prices: HC $5.00 MF $1.00**
*ARMY PRODUCTION EQUIPMENT AGENCY ROCK ISLAND ARSENAL ILL MFG TECHNOLOGY DIV*
**PICTORIAL JOURNAL OF EDM-ECM.**
Jul 65, 159p.
Unclassified report

Descriptors: (*Electroerosive machining, Industrial production), Metals, Dies, Machine tools, Structural parts, Effectiveness, Costs, Precision finishing, Machining, Electrolytes

A pictorial journal of the Electrical Discharge Machining and Electro Chemical Machining processes is presented. A brief historical background and description of these processes is included. EDM and ECM applications are a solution to machining materials which cannot be economically machined by conventional methods. EDM and ECM applications are a solution for the machining of heat-treated metals, exotic metals, and special alloys which are impossible to machine by conventional methods. EDM and ECM applications are a solution to machining geometrical configurations which otherwise would have to be partially machined then hand worked. EDM and ECM applications are a solution to machining without mechanical or thermal distortion. EDM and ECM applications are a solution to machining dies in a single piece configuration, thereby eliminating segmentation. EDM applications are a solution to obtaining servo-port shapes and contours that were either impossible before or were impractical from the standpoint of cost and/or bushing rigidity, and alignment problems. EDM has several features that lend it to production work. It can cut any die material at a cost as low as that for steel dies. Worn surfaces of forging dies usually do not require finishing; the die can be taken directly from the machine to the forge hammer. Since the electrode moves into the work automatically, machines can be left unattended for long periods of time. Technological advances have elevated these processes to a production basis. (Author)

**AD-622 826 Div. 26/4 ,15/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*STANFORD UNIV CALIF DEPT OF STATISTICS*
**R CHART CONTROL LIMITS BASED ON A SMALL NUMBER OF SUBGROUPS.**
Technical rept.,
by Frederick S. Hillier. 4 Oct 65, 22p. Rept. no. TR-83
Contract Nonr22553 Proj. NR042 002
Unclassified report

Descriptors: (*Quality control, Statistical analysis), (*Statistical analysis, Quality control), Probability, Sampling, Production control

This report verifies that conventional control limits for the Shewhart control chart for range (R chart) provide an unreliable basis for indicating when the process has gone out of statistical control unless these limits are based on a fairly large number of subgroups. A new method then is developed for using a small number of subgroups to set reliable control limits for the R chart. These limits have the property that they yield the desired probability of a Type I on each subsequent subgroup. Tables for calculating such limits are presented. The author previously has proposed an analogous method for setting control limits for an average chart. Since the R chart usually is used in conjunction with an average chart, these results enable one to set statistically sound control limits for both charts as soon as desired. This permits the valid use of both charts during the crucial initiation of a new process, during the start-up of a process just brought into statistical control again, or for a process whose total output is small. (Author)

**AD-622 828 Div. 26/4 ,15/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*STANFORD UNIV CALIF DEPT OF STATISTICS*
**STATISTICAL CONTROL OF A NORMAL PROCESS.**
Technical rept.,
by Howard M. Taylor. 7 Sep 65, 25p. Rept. no. TR-82
Contract Nonr22553 Proj. NR042 002
Unclassified report

Descriptors: (*Quality control, Statistical analysis), (*Statistical analysis, Production control), (*Production control, Statistical analysis), Probability, Costs, Optimization, Industrial production

The optimal statistical control of a simple production process which has only two underlying states, in control and out of control, is studied. The produced items are assumed to have a measurable quality characteristic which has a normal distribution with known variance. When the process leaves control the mean of this distribution shifts from good to bad, both assumed known. Costs are associated with the quality of an item and with repairing the process which returns it to a state of control. Other than immediately after repair, the process state is assumed unknown. This report gives a statistical control rule which, based on the quality history of produced items, tells when to repair the machine. The rule given minimizes the time average of the total cost of repairs plus quality. (Author)

**AD-622 869 Div. 26/4 ,26/3 ,15/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*STANFORD UNIV CALIF DEPT OF STATISTICS*
**COMPARISON OF SEVERAL PROCEDURES FOR PROCESS CONTROL.**
Technical rept.,
by Edward Pai-Chuen Kao. 30 Sep 65, 41p.
Rept. no. TR-84
Contract Nonr25553 Proj. NR042 002
Unclassified report

Descriptors: (*Statistical analysis, Quality control), (*Industrial production, Quality control), Production control, Management planning, Reliability, Probability

This paper compares three procedures for controlling a process. The Shewhart Control Chart, the Cumulative Sum Chart, and the Signed Sequential Rank Procedure. When the mean of a process shifts by a large amount, the Cumulative Sum Chart appears to be best. When deviations are small, the Signed Sequential Rank Procedure appears to be best. (Author)

**AD-622 872 Div. 26/4 ,15/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*COPENHAGEN UNIV (DENMARK) INST OF MATHEMATICAL STATISTICS*
**ON THE THEORY OF SINGLE SAMPLING INSPECTION BY ATTRIBUTES BASED ON TWO QUALITY LEVELS.**
Technical rept.,
by A. Hald. Sep 65, 39p. Rept. no. TR-9
Contract N62558 3073 Proj. NR042 225
Unclassified report

See also AD-612 676.

Descriptors: (*Quality control, Statistical tests), (*Statistical tests, Quality control), Acceptability, Reliability, Probability, Theory

Among the basic concepts in the theory of sampling inspection the producer's and the consumer's risks are the most widely used for characterizing system of sampling plans. It seems therefore strange that a comprehensive theory based on these concepts does not exist. The purpose of the present paper is to present such a theory for the case of single sampling by attributes. The theory naturally covers some wellknown results, but old as well as new results are derived by a common method and compared within the same model. The requirements defining a system of sampling plans are usually of such a nature that no explicit solution exists for the sample size and the acceptance number. The author supplements the exact (implicit) solutions by asymptotic solutions which give a better insight into the basic properties of the systems.

**AD-623 019 Div. 26/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*WATERVLIET ARSENAL N Y BENET LABS*
**THE HEATING OF METALS IN AN ELECTROLYTE.**
Technical rept.,
by Herbert Frankel. Sep 65, 28p. Rept. no. WVT-6528
Proj. DA M1 3 23041 01M7M7
Unclassified report

Descriptors: (*Heat treatment, Metals), (*Electrolytes, Heating), Quenching (Cooling), Steel, Hardening, Electric arcs, Tanks (Containers)

Steel can be heat treated electrically while submerged in an electrolyte. The advantages of this process are: (1) rapid heating, (2) prevention of scale by the automatic generation of hydrogen which surrounds the work, (3) automatic quench in the same tank when the current is interrupted. On small samples, heating rates as high as 350F per second and as low as 6.6F per second have been achieved with the liklihood of being able to increase substantially the rate with higher voltage. In a 10% solution of sodium carbonate, which is inexpensive and can be used indefinitely, current densities of 21 to 27 amperes per square inch at 200 volts were recorded during heating. Disadvantages of the process include: (1) a large D. C. generator is required for moderately large pieces, (2) the process is less than 12% efficient, (3) protected thermocouples must be attached to the work, (4) although not required for small samples, an exhaust system would be required to remove the liberated hydrogen when heating large pieces, (5) temperatures induced are not uniform throughout the specimen. (Author)

**AD-622 302 See Fld. 11/6**

**AD-622 393 See Fld. 20/12**

**AD-622 437 See Fld. 9/1**

**AD-622 462 See Fld. 9/2**

**AD-622 561 See Fld. 9/3**

**AD-622 698 See Fld. 10/3**

**AD-622 793 See Fld. 5/3**

**AD-622 821 See Fld. 9/1**

**AD-622 827 See Fld. 9/1**

**AD-622 877 See Fld. 9/1**

**AD-622 916 See Fld. 10/3**

**AD-622 922 See Fld. 6/5**

**AD-622 934 See Fld. 8/9**

**AD-622 982 See Fld. 9/1**

**AD-622 984 See Fld. 9/1**

## 13/9. MACHINERY AND TOOLS

**AD-622 367 Div. 26/5 ,8/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVY ELECTRONICS LAB SAN DIEGO CALIF*
**UTILIZATION OF HAND-TOOLS IN U. S. NAVY ELECTRONIC EQUIPMENT MAINTENANCE.**
Research rept.,
by C. R. Bilinski. 6 Feb 59, 14p. Rept. no. NEL-888
Unclassified report

Descriptors: (*Maintenance equipment, Electronics), (*Electronic equipment, Maintenance), (*Tool kits, Electronic equipments), Fastenings, Pliers, Hammers, Screwdrivers, Drills, Small tools, Wrenches

On the basis of a survey of the use of hand-tools in electronic equipment maintenance in the Fleet, it is recommended that: (1) the wide variety of fasteners (screws, nuts, and bolts) be reduced so as to reduce the variety of hand-tools currently necessary; (2) sufficient space be provided in new equipment to permit manipulation of fasteners; and (3) smaller and finer versions of the standard handtools be designed for the new, smaller equipments.

**AD-622 373 Div. 26/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**CLUTCH FOR TRANSMITTING ROTARY MOTION INTO AN AIR-TIGHT HOUSING,**
by N. I. Tseitlin, and M. V. Repkin. 21 Sep 65, 6p. Rept. no. FTD-TT-65-519
TT , 65-64155
Unclassified report

Unedited rough draft trans. of Russian patent 167 097, appl. 836421/25-8, 17 May 63, 1p.

Descriptors: (*Clutches, Pressure vessels), (*Rotary seals, Pressure vessels), Rotation, Bearings, Pipes, Hermetic seals, Patents, USSR

A clutch is described for the transmission of rotary motion into a hermetically sealed cavity, which contains a diaphragm, a driving and a driven half clutch, which has the distinguishing feature that for the purpose of assuring the transmission of rotary motion into a cavity of superhigh pressure a blank wall is designed in the form of a thin-walled tube consisting of concentric sections of thin-walled tubes with varying optimum differences of pressure.

**AD-622 409 Div. 26/6 ,14/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**POLYAMIDES-STRUCTURAL MATERIALS FOR MACHINE BUILDING,**
by V. I. Vadachkoriya, and Yu T. Lopatin. 30 Sep 65, 14p. Rept. no. FTD-TT-65-913
TT , 65-64166
Unclassified report

Unedited rough draft trans. of Mashinostroitel (USSR) n7 p38-41 1964.

Descriptors: (*Polyamide plastics, Structural parts), (*Machines, Structural parts), (*Structural parts, Polamide plastics), Gears, Bushings, Physical properties, Mechanical properties, Moistureproofing, Bearings, USSR

**AD-622 448 Div. 26/6 ,1/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**HYDRAULIC BALL LOCK FOR CONNECTING AND DISCONNECTING SECTIONS OF AIRBORNE EQUIPMENT,**
by A. P. Pyatakov, M. M. Kolobashkin, and S. P.Snovalshchikov. 21 Sep 65, 7p. Rept. no. FTD-TT-65-515
TT , 65-64173
Unclassified report

Unedited rough draft trans. of Russian patent 161 601, appl. 796966/25-8, 29 Sep 62, 1p.

Descriptors: (*Disconnect fittings, Locking fastener devices), (*Locking fastener devices, Hydraulic systems), USSR, Airborne, Pneumatic systems, Ball bearings

The object of the invention is a hydraulic ball lock for connecting and disconnecting sections of flying (airborne) equipment which has a spring piston compressing in the radial direction balls, which are located in openings in the cylinder of the piston. For the purpose of simultaneously connecting and disconnecting several connecting tenons of sections of the airborne apparatus, it is provided with a stationary race and a race held movable by balls, set on the outer surface of a cylinder, these races holding on the cylinder segments of the connecting tenons, such segments forming in the closed position of the lock a ring with two cones, which enter the inner conical bores of the races. A pneumatic differential piston, which acts on a volume of operating fluid included in the bore of the spring piston is used as a reinforcer of the lock.

**AD-622 358 See Fld. 20/13**

**AD-622 958 See Fld. 21/8**

## 13/10. MARINE ENGINEERING

**AD-622 337 Div. 31/1 ,23/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL SUBMARINE MEDICAL CENTER GROTON CONN*

**CASUALTIES IN INDIVIDUAL SUBMARINE ESCAPE,**
by Howard Moses. 24 Oct 64, 36p. Rept. no. 438
Proj. MR005 14 3002 4 17

Unclassified report

Descriptors: (*Submarine escape, Casualties), (*Naval training, Submarine escape), Buoyancy, Decompression sickness, Gas embolism, Accidents, Survival, Etiology, Diagnosis, Medical examination, Therapy, Statistical analysis, Tables

The report discusses the three methods of individual submarine escape (S.E.A., free ascent and buoyant ascent) by an analysis of the reports of casualties and available statistics. It does not, exhaustively cover air embolism theory, collective and individual submarine escape theories and techniques, or techniques of flooding compartments preparatory to escape. It is rather a clinical evaluation of submarine escape training experience.

**AD-622 427 Div. 31/5 ,9/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*DAVID TAYLOR MODEL BASIN WASHINGTON D C STRUCTURAL MECHANICS LAB*
**EXPERIMENTAL INVESTIGATION OF RIGID FLATBOTTOM BODY SLAMMING.**
Final rept.,
by Sheng-Lun Chuang. Sep 65, 37p. Proj. S R011 01 01 Task 0401
DTMB , 2041

Unclassified report

Descriptors: (*Ship hulls, Impact shock), (*Impact shock, Hydrodynamics), Acoustic properties, Drop testing, Model tests, Compressed air, Pressure, Mathematical analysis, Surfaces

An experimental investigation of rigid flat-body slamming was performed by dropping a 20-in. x 26.5-in. steel plate from various elevated positions above a calm water surface. Recording instrumentation was provided to pick up and record frequencies from direct current to 200 kilocycles, which covered the frequency range of the acoustic pressure that might act on the model. Because of the effect of the trapped air or cavitation between the falling body and the water, however, the maximum impact pressure measured was much lower than the pressure expected, if the generally accepted acoustic pressure formula is applied. (Author)

**AD-622 562 Div. 31/5**
**CFSTI Prices: HC $6.00 MF $1.25**
*DAVID TAYLOR MODEL BASIN WASHINGTON D C ACOUSTICS AND VIBRATION LAB*
**RUDDER-HULL VIBRATION AND FLUTTER ANALYSIS OF A HIGH-SPEED SHIP (PGM MOTOR GUNBOAT),**
by Ralph C. Leibowitz. Oct 65, 210p. Rept. no. 1993

Unclassified report

Descriptors: (*Flutter, Naval vessels (Combatant)), (*Hulls (Marine), Flutter), (*Marine rudders, Flutter), Ship hulls, Vibration, Fluid dynamic properties, Numerical analysis, Analog computers, Control surfaces, Hydrodynamics

This report presents the results of a 'flutter' analysis for a PGM Motor Gunboat. The results were obtained both by computing the rudder-hull vibrations (including flutter) on an analog computer and by numerical analysis. The analogs are based upon extensions of previously derived theories and methods for representing the vibrating system excited by hydrodynamic forces and for evaluating the rudder-hull structural and hydroelastic parameters and hydrodynamic parameters referenced in this report. The results indicate that (assuming a minimum conceivable value of damping) for the PSM rudder-hull system, controlsurface flutter will occur at approximately 90 knots. Moreover, the flutter characteristics of the entire rudder-hull system are more complex than classical flutter of simpler systems involving two vibration modes; hence conclusions concerning the classical or binary flutter of a two- or three-degree-of-freedom rudder do not apply to the entire rudder-hull combination. (Author)

**AD-622 553** **See Fld. 13/13**

## 13/10.1 SUBMARINE ENGINEERING

**AD-622 347** **See Fld. 11/7**

**AD-622 432** **See Fld. 20/12**

**AD-623 051** **See Fld. 11/7**

## 13/13. STRUCTURAL ENGINEERING

**AD-622 333 Div. 13/10**
**CFSTI Prices: HC $4.00 MF $0.75**
*IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER*
**TRAJECTORY ANALYSIS FOR STRUCTURAL FRAGMENTS.**
Final rept., addendum to Debris Clearance Study,
by Edward B. Ahlers. 1 Aug 65, 103p. Rept. no. SRM-65-1
Contract OCD OS62-202 Proj. IITRIM264

Unclassified report

Descriptors: (*Nuclear explosion damage, Urban areas), (*Fragmentation, Trajectories), Structural parts, Explosion effects, Analysis

Trajectories of structural fragments subject to nuclear blast winds are analyzed on the following basis: Total trajectory time is considered to be freefall time of drop from initial fragment height; Drag in vertical direction is neglected; Blast winds are considered effective for total trajectory time, i. e., structural failure occurs at time of shock arrival and does not affect the shape of the free-field blast wave; Negative phase winds are included in the analysis; Trajectories are computed for spherical masonry fragments, yielding results for certain values of effective aerodynamic coefficients; and Effects of orientation and rotation on the effective aerodynamic coefficients for angularly-shaped objects are not included.

**AD-622 552 Div. 13/10,13/4**
**CFSTI Prices: HC $4.00 MF $1.00**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**SHALLOW-BURIED MODEL ARCHES SUBJECTED TO A TRAVELING-WAVE LOAD.**
Final technical rept. for Jul 63-Feb 65,
by J. R. Allgood, and R. H. Seabold. Oct 65, 133p. Rept. no. TR-R-375

Unclassified report

Descriptors: (*Underground structures, Explosion effects), (*Civil engineering, Underground structures), (*Shelters, Underground structures), Structures, Curved profiles, Vulnerability, Blast, Shock waves, Loading (Mechanics), Soil mechanics, Data processing systems

Operation Snowball Project 3.4 consisted of tests performed on twelve model arches to determine their behavior under a traveling-wave blast loading. The prime objective was to define the body motions for a comparison with a previously developed theory. On recovery of the structures after test it was found that the four 30-inch span arches were in relatively good condition; however, most of the eight 12-inch span arches were badly damaged. The damage was inflicted by ejecta of large, densely-compacted, hard lumps of clay. Fortunately, the ejecta did not obscure the results from the large arches on which all of the electronic instrumentation was located. All electronic instrumentation operated and records were obtained for all transducers. Actual body motions were larger than those determined from the theory. Test results indicate that the foundation modulus varies and that arching shear should be expressed as a function of deflection. Considerable data was obtained on shell response. Thrust distribution around the arch was fairly uniform, even though moments on the lee side were 30 percent greater than those at the same distance from the spring line on the blastward side. Among other information, it was found that: (1) the floor displaced about the same as the free field at the corresponding elevation; and (2) large forces developed in the footing tie bars. (Author)

**AD-622 553 Div. 13/9 ,31/3**
**CFSTI Prices: HC $3.00 MF $0.75**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**REPORT ON THE EFFECTIVE FENDER SYSTEMS IN EUROPEAN COUNTRIES BY RISSELADA AND VAN LOOKEREN CAMPAGNE. REVIEW.**
Final technical rept. for Mar 64-Feb 65,
by T. T. Lee. Oct 65, 60p. Rept. no. TR-R-376
Proj. Y F015 10 03 309

Unclassified report

See also AD-613 940.

Descriptors: (*Piers, Naval shore establishments), (*Harbors, Europe), Marine safety equipment, Design, Costs, Rubber, Wood, Floats, Mooring

With the purpose of providing improved fenders for U. S. Navy use in berthing ships up to 20,000 tons, a Navycontracted report by Risselada and Van Lookeren Campagne of the Netherlands on effective fender systems in European countries is digested and reviewed. Additional material has been added by the reviewer to provide a more useful treatment of the subject of European fendering systems. Significant European systems are described, with emphasis on systems attached to docks. The principles of operation, case history, and cost data for each system are given; comments, conclusions, and recommendations by both contractor and reviewer are reported and compared; and fender design criteria developed by contractor and reviewer are presented. Energy-absorption capacities, load-deflection characteristics, cost data (initial and annual), and the estimated longevity of contractor-recommended systems have been tabulated and illustrated schematically by the reviewer for the purpose of facilitating selection of a fender system suitable for a particular marine environment and berthing structure. (Author)

**AD-622 554 Div. 13/4 ,17/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**DYNAMIC TESTS OF CONCRETE REINFORCING STEELS.**
Technical rept. for Jan 63-Dec 64,
by W. L. Cowell. Sep 65, 39p. Rept. no. TR-R-394
Proj. Y F008 08 03 401

Unclassified report

Descriptors: (*Reinforcing materials, Steel), (*Steel, Reinforced concrete), Stresses, Tensile properties, Strain (Mechanics), Shear stresses, Ductility, Tests, Statics, Dynamics, Tables

Dynamic tests were conducted on four grades of concrete reinforcing steel: (a) A15 intermediate

grade, (b) A15 hard grade, (c) A432 (60,000-psi minimum yield strength), and (d) A431 (75,000-psi minimum yield strength). The effects of strain rate (up to 1.7 in./in./sec) and machine testing speed (up to 30 in./sec) on the upper stress and tensile strength of each steel were obtained. Results are compared with other dynamic tests conducted on concrete reinforcing steels. The mechanical properties of all four grades of reinforcing steel either remained unchanged or exhibited an increase in value as the rate of testing increased. At the maximum strain rate, the percentage increase in upper yield stress was 53, 42, and 18 and the percentage increase in lower yield stress was 29, 27, and 11 for the A15 intermediate, A15 hard, and A432 grades of steel respectively. The increase in yield stress was 9 percent at the maximum strain rate for the A431 steel. The hard-grade steel showed the greatest increase in tensile strength (12,000 to 13,000 psi). The remaining steels had approximately the same increase in tensile strength (about 9,000 psi). Small increases in ductility were observed for the A432 and A431 steels. Design recommendations are given for yield stress values in terms of strain rate for the grades of reinforcing steels tested. (Author)

**AD-622 572 Div. 13/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**SNOW DRIFT ON NATURAL, DEPRESSED, AND ELEVATED SURFACES NEAR MCMURDO, ANTARCTICA.**
Technical rept. for Feb 61-Jun 65,
by N. S. Stehle, and G. E. Sherwood. Oct 65, 29p. Rept. no. TR-R-398
Proj. Y F015 11 01 025

Unclassified report

Descriptors: (*Snow, Drift), (*Site selection, Polar regions), Wind, Inhibition, Terrain, Buildings, Maintenance

Drifting snow in polar areas results in problems of logistics and maintenance. To obtain knowledge of snow drift and accumulation on the Ross Ice Shelf near McMurdo Station, Antarctica, measurements of drift were made on natural, depressed, and elevated surfaces, and in camp and storage areas on these surfaces. From these measurements, it was concluded that depressed surfaces quickly become filled with snow to the natural-surface level, and should be avoided in locations of annual accumulation. Elevated surfaces accumulate minimal drift when used for roads, runways, or storage areas, and should be investigated for use as future camp locations. (Author)

**AD-622 902 Div. 13/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*POLYTECHNIC INST OF BROOKLYN N Y DEPT OF AEROSPACE ENGINEERING AND APPLIED MECHANICS*
**BUCKLING OF CIRCULAR CYLINDRICAL SHELLS WITH EVENLY SPACED, EQUAL STRENGTH CIRCULAR RING FRAMES. PART II,**
by V. L. Salerno, and Bernard Levine. Jun 50, 30p. Rept. no. PIBAL-169
Contract N6onr263 03 Proj. NR064 167

Unclassified report

Descriptors: (*Cylindrical bodies, Structural shells), (*Buckling (Mechanics), Stiffened cylinders), (*Stiffened cylinders, Buckling (Mechanics)), (*Structural shells, Cylindrical bodies), Loading (Mechanics), Rings, Hydrostatic pressure, Mathematical analysis

A strain-energy solution of the buckling of a circular cylindrical shell reinforced by evenly spaced circular ring frames of equal strength under hydrostatic pressure was obtained in Part I. The buckled shape was assumed to be sinusoidal with inflection points at the location of the ring frames. For several geometrical configurations the critical pressure was found to be from two to three times that given by the von Mises solution. The assumed buckled shape used in Report I was modified to permit the inflection points of the deformed shape to occur between ring frames. For the geometrical configurations calculated in Report I, the critical pressure was found to be about one and one-third times that given by the von Mises solution. This represents a marked improvement over the solution obtained in Report I. (Author)

**AD-623 010 Div. 13/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL CIVIL ENGINEERING LAB PORT HUENEME CALIF*
**IMPROVEMENTS TO POLAR CAMPS, USE OF A 64-FOOT JAMESWAY.**
Technical note,
by G. E. Sherwood. Sep 65, 25p. Rept. no. TN-N-771
Proj. Y F015 11 01 105

Unclassified report

Descriptors: (*Polar regions, Buildings), (*Buildings, Polar regions), (*Civil engineering, Polar regions), Structures, Supports, Protective coverings, Paulins, Heating, Military facilities

Certain practical considerations have usually limited the length of Jamesways to 48 feet' however, by using a side entry and heating the building with a forced-air furnace, its length can be extended indefinitely. Although economy of construction and heating increase with length, a limit of 64 feet was set for fire safety and possible tow as an assembled building. This length is easily adaptable to the NCEL 25-man pioneer polar camp. A 64-foot Jamesway was used as a 12-man quarters in the NCEL experimental camp near McMurdo, Antarctica, during Deep Freeze 64 and 65. The building size and arrangement worked quite well; however, some improvements are needed in the outfitting. The curtain partitions require some redesign for increased strength and better attachment to the arch ribs in the building. The electrical harness can be simplified by replacing the prewired conduit with insulated cable, and the lights need to be relocated for improved illumination. These items are currently being redesigned by the Laboratory. A 64-foot Jamesway was also used in the experimental camp for a mess hall, galley and utility building. This combination permitted placement of a snow melter and all high-water-use facilities in the same building, thus eliminating most of the outdoor water distribution lines in the present pioneer polar camp design. The combination building worked exceptionally well; however, the galley layout is being improved for better traffic circulation. (Author)

**AD-622 432** **See Fld. 20/12**

**AD-622 486** **See Fld. 22**

**AD-622 835** **See Fld. 5/9**

**AD-622 980** **See Fld. 19/4**

## 14/2. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

**AD-622 332 Div. 30/5 ,12/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY ROCKET AND GUIDED MISSILE AGENCY REDSTONE ARSENAL ALA*
**ECONOMIC CONSEQUENCES OF UNRELIABILITY,**
by Robert Lusser. 27 Jun 58, 14p.

Unclassified report

Prepared for presentation at Seminar on Systems Engineering and Missiles Operation Research, Pennsylvania State Univ., University Park, 18 Aug 58.

Descriptors: (*Reliability, Economics), (*Guided missiles, Reliability), Costs, Design, Maintenance, Education, Systems engineering

Contents (speech on the subject of reliability, defined as the probability that a device will function properly during a mission): Reliability formula; Consequences of unreliability in commercial and military equipment; Maintenance cost, a yardstick of unreliability; Designing for reliability; How much shall we spend for reliability; Reliability skill; Life or death aspect of reliability; Reliability a new subject of education.

**AD-622 384 Div. 30/3 ,10/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**FUEL-HEATING UNITS FOR AIRCRAFT TEST STANDS,**
by L. S. Arinushkin, and Yu. V. Belyaev. 17 Sep 65, 7p. Rept. no. FTD-TT-65-774
TT , 65-64161

Unclassified report

Unedited rough draft trans. of Russian patent 157 176, appl. 695200/40-23, 30 Jan 61, 3p.

Descriptors: (*Aircraft, Test equipment), (*Test equipment, Aircraft), (*Aviation fuels, Heating), Electrical equipment, Heat exchangers, Cylindrical bodies, Pipes, Patents, USSR

Object of the invention: A unit for preheating fuel in aircraft test stands, which includes in itself a preheater of the liquid heat carrier with electrical heaters and a pump as well as a preheater of the fuel with coil-pipe heat exchangers, joined by tube connections which has the distinguishing feature that for the purpose of shortening the time and expenditure of electrical energy for heating the heat carrier and the fuel, and also for simplifying the design and operation of the unit, it in the preheater of the heat carrier is constructed in the form of two coaxial vertically disposed cylinders, provided with electrical heaters while at the same time in the cavity of the lesser cylinder there is mounted a pump joined by a vertical shaft with a two-speed electrical motor which assures the circulation of the heat carrier through the pipe coils of the preheater of the fuel or the controllable crossover connection in the heating up of the heat carrier. (Author)

**AD-622 518 Div. 30/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*TRANSDUCER INFORMATION CENTER BATTELLE MEMORIAL INST COLUMBUS OHIO*
**QUARTERLY ACCESSION LIST 10.**
15 Oct 65, 37p. Rept. no. tic accession list no. 10
Contract AF33 615 2532 Proj. 8222 Task 822203

Unclassified report

See also AD-617 346.

Descriptors: (*Transducers, Bibliographies), (*Telemeter systems, Bibliographies), (*Control systems, Bibliographies), (*Servomechanisms, Bibliographies), Measuring devices (Electrical + electronic), Meters, Indexes, Abstracting, Information retrieval, Documentation

**AD-622 665 Div. 30/4 ,9/7 ,25/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*SHEFFIELD UNIV (ENGLAND) DEPT OF FUEL TECHNOLOGY AND CHEMICAL ENGINEERING*
**METHODS OF ELECTROMAGNETIC INDUCTION APPLIED TO THE MEASUREMENT OF SUPERSONIC VELOCITIES IN SHOCK TUNNELS.**

Administrative rept. no. 1,
by R. J. Parsons, and M. A. Patrick. Feb 65, 12p. Contract AF EOAR23 65 Proj. 9711 Task 971101
AFOSR , 65-1327

Unclassified report

Descriptors: (*Shock tubes, Inductance), (*Supersonic characteristics, Measurement), Velocity, Supersonic flow, Magnetohydrodynamics, Great Britain

A technique based on electromagnetic induction is proposed to measure the velocity of the flow in a hypersonic shock tunnel. The expanded flow in the tunnel test section has a sufficiently high conductivity level to allow the generation of an MHD voltage in the presence of a magnetic field, which can then be used to indicate the flow velocity. To overcome charge effects on the electrodes, the magnetohydrodynamic voltage from such a device should be of the order of 100 v. For a true open circuit reading the input impedence of the external circuit should be very high. (Author)

**AD-622 704 Div. 30/3 ,25/7 ,4/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*TUFTS UNIV MEDFORD MASS DEPT OF CHEMISTRY*
**DIELECTRIC DISPERSION.**
Quarterly status rept. no. 17 (Summary), 1 Oct 64-30 Sep 65,
by Karl H. Illinger. 30 Sep 65, 4p. Contract Nonr49419 Proj. NR014 240

Unclassified report

Descriptors: (*Microwave spectroscopy, Spectrum analyzers), Microwave oscillators, Line spectrum, Circuits

With the prototype broadband microwave spectrometer, covering in a continuous manner the frequency range between 8.2 and 40 kmc (0.75 to 3.66 cm wavelength), constructed earlier under this contract, as a starting point, salient modifications have recently been made which increase the sensitivity and stability of the existing system. Frequency stabilization of the microwave oscillator, capability of direct frequency measurement to electronic counter accuracy, power leveling and phase-sensitive detection have been incorporated. A design for a broadband spectrometer operating in the range between 50 and 75 kmc (0.4 to 0.6 cm), and extension of this capability to the harmonic range (0.2 to 0.3 cm) has been completed; frequency stabilization of these systems is accomplished by injection phase-locking from the stable 8.2 to 40 kmc referred to above. (Author)

**AD-622 778 Div. 30/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**MODIFICATION OF TEST SET, CRYSTAL UNIT, QUARTZ TS-710/TSM.**
Technical rept.,
by Charles L. Shibla. Jul 65, 40p. Rept. no. ECOM-2618
Proj. 1P6 22001A058 02 Task 1P6 22001A058 02 08

Unclassified report

Descriptors: (*Test sets, Crystals), Quartz, Performance (Engineering), Low frequency, Very low frequency, Medium frequency

A modification to Test Set, Crystal Unit, Quartz TS710/TSM is described. The modification is comprised of revisions in several circuit areas with a resultant improvement in operation. Overdrive of low-resistance crystals is minimized, crystal power is more accurately and conveniently measured, and frequency/resistance calibration with any standard military crystal unit is possible. (Author)

**AD-o22 832 Div. 30/5 ,15/1 ,25/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*STANFORD UNIV CALIF DEPT OF MATHEMATICS*
**ON THE CONDUCTIVITY OF A CIRCULAR APERTURE.**
Technical rept.,
by Harold Levine. 15 Sep 65, 33p. Rept. no. TR-7 Contract Nonr22574 Proj. NR041 313

Unclassified report

Descriptors: (*Conductivity, Boundary valve problems), Green's function, Integral equations, Calculus of variations, Potential theory, Cylindrical bodies

The steady current flow through a cylindrical tube that has a plane constriction in the form of a transverse wall with a coaxial circular aperture is analyzed; and particular attention is given to means of determining the additional flow resistance arising therefrom. A theoretical approximation for the reciprocal of the latter quantity, or the aperture conductivity, is obtained when the aperture and tube radii are nearly equal, thus closing a gap left in previous calculations by Fock. (Author)

**AD-622 870 Div. 30/5 ,15/1 ,25/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*STANFORD UNIV CALIF DEPT OF MATHEMATICS*
**THE EFFECTIVE CONDUCTIVITY OF A REGULAR COMPOSITE MEDIUM.**
Technical rept.,
by Harold Levine. 26 Jul 65, 29p. Rept. no. TR-6 Contract Nonr22574 Proj. NR041 313

Unclassified report

Descriptors: (*Conductivity, Boundary value problems), Green's function, Integral equations, Potential theory, Cylindrical bodies

The advantages of a Green's function method are exemplified by the analysis of steady potential flow through a homogeneous medium containing a regular array of subdomains where a different value of the conductivity prevails. It is shown, in particular, that the results previously obtained by Rayleigh for the square array of cylindrical obstacles with infinite conductivity are recovered in a more efficient manner; and that the method is suitable for handling either widely dispersed or closely packed arrays. (Author)

**AD-622 912 Div. 30/4 ,16/4**
*CALIFORNIA UNIV LOS ANGELES SPACE BIOLOGY LAB*
**A LARGE SIZE ECONOMICAL PLANT GROWTH CHAMBER,**
by Takashi Hoshizaki, John Zweizig, and Paul Brogerg. 12 Mar 63, 6p. Contract AF AFOSR61 81
AFOSR , 65-0937

Unclassified report

Pub. in Proceedings of the American Society for Horticultural Science v83 p844-8 1963 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Biological laboratories, Controlled atmospheres), (*Laboratory equipment, Biological laboratories), Plants (Botany), Growth, Temperature control, Electrical equipment, Refrigeration systems, Thermostats, Costs

The report is intended to give sufficient detail relative to a growth chamber so that such a chamber can be constructed with a minimum of effort and financial expenditure. Additional plans and data are available from the authors.

**AD-622 926 Div. 30/3 ,25/6**
*NATIONAL BUREAU OF STANDARDS BOULDER COLO RADIO STANDARDS ENGINEERING DIV*
**A COMPARISON BETWEEN A SWITCHED AND A CORRELATION RADIOMETER FOR CRYOGENIC NOISE SOURCE MEASUREMENTS,**
by David F. Wait, and Charles L. Trembath. 1964, 6p. Proj. arpa order 515

Unclassified report

Pub. in Instrument Society of America, Annual ISA Conference and Exhibit (20th) October 4-7, 1965, Los Angeles. (Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Radiometers, Cryogenics), Noise (Radio), Measurement, Microwave frequency, Effectiveness, Sensitivity

A radiometer which is capable of comparing cryogenic noise sources within 0.1% is possible with either the S-DC or Dicke radiometer provided the front end or lossy elements are cooled. The S-D-C radiometer with a nonswitching multiplier has the most sensitivity, while there is less sensitivity when the Dicke system is used in the multiplier. The S-D-C system eliminates the problems of switching cryogenic loads. (Author)

**AD-622 943 Div. 30/5 ,4/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**ANALYSIS OF GASES IN VACUUM SYSTEMS.**
28 Jan 64, 19p. Rept. no. AID-U-64-1
TT , 65-64297

Unclassified report

Survey based on Soviet open-source materials covering the period 1958-1963.

Descriptors: (*Gas analysis, Reviews), (*Vacuum, Gas analysis), Mass spectroscopy, Ionization chambers, Adsorption, Vacuum apparatus, Plasma medium, USSR

Abstracts are given of 22 papers. An author index is included.

**AD-623 049 Div. 30/3 ,25/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*ALLIED RESEARCH ASSOCIATES INC CONCORD MASS*
**A BONDED POLARISCOPE FOR THREE-DIMENSIONAL PHOTOVISCOELASTIC STUDIES.**
Final rept.,
by Herbert Becker, and Ralph Papirno. 10 Dec 64, 34p. Rept. no. ARA-F-226-2
Contract Nonr405800FBM

Unclassified report

Descriptors: (*Polariscopes, Bonding), (*Viscoelasticity, Test methods), Test equipment, Adhesives

A method of incorporating an internally bonded polariscope has been developed for use with viscoelastic materials. The newly developed technique serves to isolate one or more planes in a three-dimensional model so that a three-dimensional photoviscoelastic analysis can be performed. The model may be subjected to a variety of loadings at room temperature and only the photomechanical effects in the isolated plane will be observable. In the experimental program a viscoelastic cement was developed whose mechanical properties matched those of a chosen model material. The cement was used to bond the polarizing sheet into the model. The restraining effect of the stiff elastic Polaroid sheet was reduced by cutting a gridwork of slits into this material. Tests performed on simple disk models and on star grain rocket models containing bonded polariscope elements showed structural continuity through the cemented joint. The fringe pattern observed through the bonded polariscope in star grain models was the same as that observed using a conventional polariscope. On the basis of the favorable test results the newly developed technique was judged acceptable. (Author)

AD-622 371 See Fld. 4/2

AD-622 394 See Fld. 14/5

AD-622 405 See Fld. 9/1

AD-622 417 See Fld. 5/1

AD-622 420 See Fld. 6/12

AD-622 436 See Fld. 8/7

AD-622 442 See Fld. 11/6

AD-622 511 See Fld. 8/6

AD-622 556 See Fld. 9/1

AD-622 603 See Fld. 20/6

AD-622 612 See Fld. 20/6

AD-622 629 See Fld. 18/8

AD-622 630 See Fld. 9/1

AD-622 633 See Fld. 19/1

AD-622 657 See Fld. 7/4

AD-622 670 See Fld. 18/4

AD-622 701 See Fld. 20/3

AD-622 717 See Fld. 4/2

AD-622 722 See Fld. 7/3

AD-622 725 See Fld. 4/2

AD-622 811 See Fld. 20/3

AD-622 892 See Fld. 20/6

AD-622 980 See Fld. 19/4

AD-623 033 See Fld. 7/4

AD-623 059 See Fld. 11/1

## 14/5. REPROGRAPHY

**AD-622 394 Div. 24/2 ,25/4 ,30/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*AIRCRAFT ARMAMENTS INC COCKEYSVILLE MD*
**RESEARCH ON THE ADAPTABILITY OF LASERS TO SCHLIEREN SYSTEMS.**
Final technical rept.,
by John A. Ackerman, and Gordon A. Brill,Jr..
Jul 65, 45p. Contract AF33 615 1914 Proj. 7065
ARL , 65-139

Unclassified report

Descriptors: (*Lasers, Photographic lighting systems), (*Photographic lighting systems, Lasers), (*Schlieren photography, Photographic lighting systems), Wind tunnels, High-speed photography, Photographic equipment, Optical equipment, Helium, Neon, Light, Oscillators, Photographic techniques

The purpose of the present contract was to develop and produce a laser source for the 10 inch schlieren system presently in use at the Fluid Dynamics Facilities Laboratory of ARL. The source, which uses a He-Ne Gas Laser for continuous viewing in conjunction with a Q-switched ruby source for taking very short exposure time photographs, has been developed and incorporated into the existing system. Certain problems still exist which greatly limit the overall system performance, but these are due to factors wuch as vibration, temperature fluctuations, and the quality of the existing optical system. Recommendations are made for the development of an overall system which will allow the potential of the laser source to be realized. (Author)

**AD-622 571 Div. 24/2 ,25/4 ,2/9 ,2/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL RESEARCH LAB WASHINGTON D C*
**DIMENSIONAL PARAMETERS OF RESOLVED GLITTER FROM THE BAY OF PANAMA,**
by Kingsley G. Williams. Sep 65, 30p. Rept. no. NRL Memo. rept. 1642

Unclassified report

Descriptors: (*Aerial photographs, Photointerpretability), (*Water waves, Reflection), (*Reflection, Photographic images), Ocean waves, Films, Oils, Photographic analysis, Optical phenomena, Statistical distributions

Studies were made of the temporal and spatial distribution and dimensions of resolved reflections from a wind-stressed water surface in the Bay of Panama using a modification of Schooley's vertical flash technique at a photographic scale of 17:1. The mean spacing of 'glints' at wind velocities of 6-12 knots was about 0.5 inches leading to a maximum glitter density of 75,000 glints/sq ft/sec. Large waves reduced this density to a mean measured value of about 10,000 glints/sq ft/sec and an oil slick further reduced the density to about 360 glints/sq ft/sec. A mean maximum slope of about 9 degrees was reduced by an oil slick to somewhat less than 4 degrees. Glint dimensions averaged 0.04 x 0.14 inches for clean water and 0.07 x 0.29 inches for slick covered water. Distribution of numbers of glints as a function of slope was approximately Gaussian. (Author)

**AD-622 940 Div. 24/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**ELECTROSTATIC PHOTOGRAPHY.**
28 Jan 64, 49p. Rept. no. AID-U-64-2
TT , 65-64285

Unclassified report

Bibliography of Soviet Literature for the period 1959-1963.

Descriptors: (*Electrophotography, USSR), Photographic equipment, Photographic materials, Photographic techniques, Electrostatics, Bibliographies

This bibliography is intended as a guide to Soviet literature on electrostatic photography. The bibliography covers the period 1959-1963. The 68 entries are arranged alphabetically by author within each section. An annotation is provided for each article. (Author)

AD-622 465 See Fld. 8/2

AD-622 471 See Fld. 19/5

AD-622 520 See Fld. 9/2

## 15/3. DEFENSE

AD-622 714 See Fld. 5/10

AD-622 817 See Fld. 5/9

## 15/5. LOGISTICS

**AD-622 766 Div. 18/3 ,26/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**INCREASED OPERATIONAL CAPABILITY THROUGH LOGISTICS ANALYSIS,**
by Murray A. Geisler, and Chauncey F. Bell,Jr..
Sep 65, 21p. Rept. no. P-3233

Unclassified report

Text of briefing prepared for the World Wide Materiel Conference at Orlando AFB, Florida, Oct 5-7, 1965.

Descriptors: (*Logistics, Analysis), (*Air Force operations, Optimization), Inventory control, Systems engineering, Simulation, Management engineering, Costs, Information retrieval, Maintenance, Armed forces supplies

Joint Air Force-Rand work is reported that is directed toward increasing AF operational capability through logistics analysis. A plea is made for modifying the current information collection system so as to capture fundamental data that are being lost. As an example, there is cited the return of specifically configured aircraft from a specific mission with its aircraft. The charge is made that not enough information is obtained from the pilot, the mechanic of the ground crew, and the shop technician. Another analysis is that concerned with a particular system on F-105 aircraft where there are collected the number of sorties in each of a number of samples, the number of write-ups on the system as a result of the sorties, the mean obtained by dividing the number of write-ups by the number of sorties, and the degree of statistical variance from the mean. The analysis highlights the problem of trying to work with averages provided in most summary reports rather than with detailed information from a debriefing form that identifies the kind of missions. Other examples of analysis are given that are regarded essential for management; costs for getting the additional data are called very small.

AD-622 336 See Fld. 17/8

AD-622 676 See Fld. 9/2

## 15/7. OPERATIONS, STRATEGY, AND TACTICS

**AD-622 939 Div. 18/7 ,32/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**STANDING GUARD OVER THE ACHIEVEMENTS OF COMMUNISM. II. ALWAYS ON GUARD. III. THE FAITHFUL GUARDIAN OF PEACE.**
Special trans.
3 Mar 64, 12p. Rept. no. AID-U-64-10
TT , 65-64284

Unclassified report

Three newspaper articles for 23 Feb 64.

Descriptors: (*Armed forces (Foreign), USSR), Communism, Political science, Government (Foreign), Leadership, Nuclear weapons, Nuclear warfare

AD-622 444 See Fld. 17/7

AD-623 034 See Fld. 19/5

## 16. MISSILE TECHNOLOGY

AD-622 332 See Fld. 14/2

AD-622 335 See Fld. 8/2

AD-622 383 See Fld. 22

AD-622 386 See Fld. 22

AD-622 396 See Fld. 4/2

AD-622 428 See Fld. 13/8

AD-622 435 See Fld. 11/7

AD-622 443 See Fld. 22

AD-622 463 See Fld. 22

AD-622 481 See Fld. 22

AD-622 484 See Fld. 22

AD-622 486 See Fld. 22

AD-622 494 See Fld. 22

AD-622 494 See Fld. 22

AD-622 694 See Fld. 22

AD-622 715 See Fld. 20/3

AD-623 081 See Fld. 22

## 17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

AD-622 360 See Fld. 22

AD-622 478 See Fld. 22

AD-622 479 See Fld. 8/2

AD-622 483 See Fld. 22

AD-622 605 See Fld. 22

AD-622 812 See Fld. 22

AD-622 867 See Fld. 17/9

AD-622 991 See Fld. 22

## 17/1. ACOUSTIC DETECTION

AD-622 747 See Fld. 6/16

AD-623 015 See Fld. 20/1

## 17/2. COMMUNICATIONS

**AD-622 610 Div. 5/5 ,8/2**
**CFSTI Prices: HC $3.00 MF $0.75**
*NORTH ELECTRIC CO GALION OHIO*
**STUDY OF AUTOMATIC ROUTING IN A SWITCHED SYSTEM UTILIZING SATURATION SIGNALING.**
Quarterly rept. no. 3, 1 Jan-31 Mar 65,
by H. Hambrock, L. Robinson, H. Rondina, R. Starr, and S. Sternung. 31 Mar 65, 100p. Contract DA28 043AMC00342E Proj. DA28 043AMC Task 1E6 34301D246 02 01
Unclassified report

See also AD-620 686.

Descriptors: (*Telephone communication systems, Switching circuits), (*Switching circuits, Telephone signals), Automatic, Simulation, Data transmission systems, Voice communication systems, Digital systems, Command + control systems

Functional definition of a saturation signaling node capable of handling digital information at 38.4 Kb/sec. transmission rate with priority and with store and forward is presented by means of text and a comprehensive flow chart. Saturation signaling on a commandarea network at the present day analog switching speed of 1.1 sec. was simulated with better than expected results. The area network (Network A) optimized for direct routing was obtained by iterative simulations. (Author)

**AD-622 786 Div. 5/4 ,8/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y*
**RELATIVE INFLUENCE OF TIME, COMPLEXITY, AND DENSITY ON UTILIZATION OF CODED LARGESCALE DISPLAYS.**
Final rept. for Jun 64-Mar 65,
by William R. Dyer, and Raymond J. Christman. Sep 65, 25p. Rept. no. RADC-TR-65-325
Proj. 5597 Task 559705
Unclassified report

Descriptors: (*Television display systems, Coding), (*Coding, Television display systems), Color television, Command + control systems, Air force equipment, Visual perception, Search theory

A study was accomplished to demonstrate the influence of display coding on a task of locating and identifying specific entries in a numerical matrix. Various relationships among factors of matrix size, complexity, and viewing time were determined and are presented in graphic form. In addition to demonstrating the expected efficacy of coding, several additional findings were revealed. It was found that coding is of particular value when search time is limited, and that as the difficulty of the task increases the value of coding also increases. It was also shown that with longer search times available, the relative value of coding appeared to increase. This finding was interpreted as the result of a two-stage data extra-ction effort: the first stage being a locating of the pertinent data entries, the second stage being the actual reading of the displayed values. (Author)

**AD-623 028 Div. 5/1 ,28/3**
**CFSTI Prices: HC $3.00 MF $0.75**
*ITT FEDERAL LABS NUTLEY N J*
**HUMAN FACTORS RESEARCH IN 3-D DATA PRESENTATION.**
Final rept. for Sep 62-May 65,
by Raymond C. Bassett, Morton H. Kahn, Moira LaMay, Joel Levy, and Donald E. Page. Jun 65, 77p. Contract AF19 628 274 Proj. 7682 Task 768201
ESD , TR-65-462
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Stereoscopic display systems, Human engineering), (*Human engineering, Stereoscopic display systems), Cathode ray tubes, Images, Target discrimination, Visual perception, Psychophysiology

A series of experiments was performed to evaluate some of the operating characteristics and potential utility of a volumetric (i.e., real) three-dimensional display produced by projection of a CRT image onto a rotating translucent screen. Some of the variables tested were perceptibility of relative location of point targets in close proximity, perception of location of point targets relative to display boundaries and perception of absolute and relative motion of targets in the volume. Estimation of location and motion were found to be highly accurate and quite rapid. While the results do not point conclusively to specific applications, the utility of volumetric 3-D in making fine position and motion discriminations has been demonstrated. Further study would be required to ascertain utility in practical situations such as air traffic control, space surveillance, etc. (Author)

AD-622 321 See Fld. 9/4

AD-622 493 See Fld. 17/9

AD-622 589 See Fld. 6/3

AD-622 666 See Fld. 17/9

AD-622 990 See Fld. 20/6

## 17/2.1 RADIO COMMUNICATIONS

**AD-622 810 Div. 5/2 ,6/6**
**CFSTI Prices: HC $7.00 MF $1.50**
*GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF*
**INVESTIGATION TO ESTABLISH MEASUREMENT PROCEDURES AND DESIGN CONFIGURATION FOR AUTOMATED INTERFERENCE-MEASURING INSTRUMENTATION.**
Final rept. for Jul 64-Jul 65,
by Herbert K. Mertel. Oct 65, 324p. Rept. no. GD/C-AWV65-001
Contract AF33 615 1972 Proj. 1515
SEG , TR-65-47
Unclassified report

Descriptors: (*Interference analyzers, Automation), Radiofrequency, Extremely low frequency, Antennas, Radiofrequency interference, Electronic countermeasures, Display systems, Radio receivers, Data processing systems, Design, Electronic equipment, Measurement

A design configuration for an automated electromagnetic interference measuring system for the spectrum 20 Hz to 40 GHz is presented. The design utilizes only components, materials, circuitry, and techniques that are feasible within present (1965) technology. The design approach gives details and recommendations leading to a final design and prototype. The results of a literature and in-

dustry survey are presented. The system provides adequate sensitivity to detect and measure interference in accordance with specifications MIL-I-6181D, MIL-I-26600, MIL-STD-826, and similar specifications. (Author)

**AD-622 321** See Fld. 9/4

**AD-622 418** See Fld. 9/1

**AD-622 506** See Fld. 8/10

**AD-623 050** See Fld. 20/14

## 17/7. NAVIGATION AND GUIDANCE

**AD-622 353 Div. 19/2 ,19/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*GENERAL PRECISION LAB DIV GENERAL PRECISION INC PLEASANTVILLE N Y*
**AUTOMATIC NAVIGATOR AN/APN-66.**
Engineering rept.
1957, 35p. Rept. no. ER-A11-51 suppl.
Contract W33 038ac14192
ATI , 88 754 SUPPL.
Unclassified report

Descriptors: (*Doppler navigation, Doppler systems), (*Automatic navigators, Doppler navigation), (*Navigation, Doppler systems), (*Navigation computers, Doppler systems), Adaptive control systems, Flight control systems, Navigational aids, Doppler radar, Doppler effect

The Automatic Navigator AN/APN-66 is a completely self-contained, radar dead-reckoning navigation system. It provides a highly accurate, instantaneous, and continuous presentation of true ground speed and drift angle, the two most important quantities in dead reckoning navigation. The APN-66 provides continuous course to destination, present position, distance, and heading data to the pilot or navigator by combining ground speed and drift angle with other navigational parameters such as starting position, destination position, heading reference, and time. It can also provide control voltages to the automatic pilot for completely automatic flight to the destination, and giving a visual indication to the pilot.

**AD-622 444 Div. 19/5 ,18/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*AERONAUTICAL CHART AND INFORMATION CENTER ST LOUIS MO*
**CARTOGRAPHIC PRODUCTS TO SUPPORT TACTICAL OPERATIONS.**
Technical paper,
by John G. Eriksen. May 64, 19p. Rept. no. ACID-TP-14
Unclassified report

Based on paper presented at Annual Meeting, American Congress on Surveying and Mapping (24th), 1964 ACSM-ASP Convention, Washington, D. C., 10-20 Mar 64.

Descriptors: (*Mapping, Tactial warfare), (*Navigation charts, Air Force), (*Air Force operations, Navigational charts), Military requirements, Aeronautics, Aerial warfare

Aeronautical Charts and Flight Information Products are designed to meet the specific needs of the United States Air Force for aerospace navigation with the ultimate purpose leading to the identification and destruction of a target. The Aeronautical Chart and Information Center (ACIC) is a supporting organization for the combat air capability of the Department of Defense. ACIC customers include not only only the U.S. Air Force but Army, Navy and Marine aviation units plus the air arms of our allies. ACICS effectiveness is measured by the quality and timeliness of the support it furnishes. Consequently, ACICS total capability is devoted to satisfying the users' needs. To meet these needs, ACIC maintains a staff of requirements research people and design cartographers. This team provides an analysis of each new weapon system, tactical innovation, and technological break-through in aerospace hardware, to determine their cartographic implications. These analyses are then translated into usable cartographic products to support the operational air forces.

Aeronautical Charts and Flight Information Products are designed to meet the specific needs of the United States Air Force for aerospace navigation with the ultimate purpose leading to the identification and destruction of a target. The Aeronautical Chart and Information Center (ACIC) is a supporting organization for the combat air capability of the Department of Defense. ACIC customers include not only only the U.S. Air Force but Army, Navy and Marine aviation units plus the air arms of our allies. ACICS effectiveness is

**AD-622 497 Div. 19/5**
**CFSTI Prices: HC $3.00 MF $0.75**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**CALCULATION FOR GYROCOMPASS ERRORS IN SHIP NAVIGATION (UCHET POGRESHNOSTEI V SUDOVOZHDENII),**
by E. L. Smirnov, A. A. Yakushenkov, M. E. Blinnikov, and V. G. Filipchenko. 31 Aug 65, 76p.
Rept. no. FTD-MT-65-147
TT , 65-64201
Unclassified report

Edited machine trans. of mono. Uchet Pogreshnostei Girokompasa v Sudovozhdenii, Moscow, 1964 68p. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Gyro compasses, Errors), (*Navigational aids, Ships), Determination, USSR

**AD-622 864 Div. 19/3 ,8/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*AIRBORNE INSTRUMENTS LAB DEER PARK N Y*
**BEACON VIDEO DEFRUITING EQUIPMENT.**
Final rept.,
by P. G. Holcombe. Aug 65, 27p. Contract FA WA4624 Proj. AIL 8806 ,SRDS 242 001 03
SRDS , RD-65-87
Unclassified report

Descriptors: (*Interference analyzers, Radar beacons), (*Radar beacons, Air traffic control systems), (*Air traffic control systems, Radar interference), Background, Radar signals, Suppressors, Correlators, Storage tubes, Video signals

The Beacon Video Defruiting Equipment is, in essence, a synchronous detector, which is constructed of transistor circuitry and storage tubes. The purpose of the equipment is to remove nonsynchronous signals from the beacon video replies in the Air Traffic Control Radar Beacon System. During operation, complete independence of the radar PRF and the beacon mode interlace ratios is maintained. (Author)

**AD-622 865 Div. 19/3 ,33/1**
**CFSTI Prices: HC $4.00 MF $0.75**
*UNIVAC DIV SPERRY RAND CORP ST PAUL MINN*
**PROGRAMING, INTEGRATION AND CHECKOUT OF THE ADVANCED RADAR TRAFFIC CONTROL SYSTEM.**
Final rept.
Apr 65, 116p. Rept. no. PX-3489
Contract FA WA4710 Proj. 105 200D
SRDS , RD-65-48
Unclassified report

Descriptors: (*Air traffic control systems, Radar equipment), Radar tracking, Tracking, Track-while-scan, Digital systems, Radar beacons, Display systems, Data processing systems, Digital computers, Programming (Computers), Automation, Tests, Correlation techniques, Checkout procedures, Storage tubes, Video signals, Magnetic cores, Computer storage devices, Georgia

The Advanced Radar Traffic Control System, installed in the airport terminal building in Atlanta, Georgia, provides terminal area controllers with bright display of symbolic and alphanumeric data relative to controller initiated tracks and automatically maintains continuous association between this data and beacon and radar video by means of digital tracking techniques. The system consists of a digital computational subsystem, a beacon subsystem, and two display subsystems. The major functional elements of the operational computer program are tracking, processing of controller inserted data and requests, and preparation of property formatted messages for display. The tracking function is a multi-state alpha, beta, straight-line tracking with logical turn detection. The availability of the system's general purpose digital computers made possible an approach to equipment system integration which was primarily based upon a sequence of specially designed programed tests. System checkout was achieved through execution of a sequence of tests designed to methodically verify prescribed system operation. Special test and data extraction programs were prepared for and employed in system checkout.

## 17/8. OPTICAL DETECTION

**AD-622 336 Div. 6/5 ,29/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY TROPIC TEST CENTER FORT CLAYTON (CANAL ZONE)*
**JUNGLE VISION IV: AN EXPLORATORY STUDY ON THE USE OF YELLOW LENSES TO AID PERSONNEL DETECTION IN AN EVERGREEN RAINFOREST.**
Research rept ,
by D. A. Dobbins, M. Gast, and C. M. Kindick.
Jul 65, 32p. Rept. no. RR-4
Proj. DA 1L013001A91A00 001
Unclassified report

Descriptors: (*Lenses, Colors), (*Humans, Detection), (*Target discrimination, Eyeglasses), Tropical regions, Jungles, Panama, Feasibility studies, Human engineering, Thresholds (Physiology)

The purpose of the study was to explore the use of nonmagnifying yellow lenses to enhance personnel detection in the evergreen rainforest. Twelve US Infantry soldiers with normal vision, using spectacles fitted with yellow lenses, were each presented 45 randomly appearing human targets within a 180 deg. field of search. The targets, who were dressed in standard Army field clothes, stood motionless at predetermined distance markers facing the observer. Tests were conducted on three sites in the evergreen rainforest of the Canal Zone during the dry season (April 1965). Results were compared with those obtained from 18 additional observers with unaided vision, who were tested on the same sites and under the same conditions. The major effect of using the yellow lenses was to restrict rather than increase detectability of human targets. Perceptually, the lenses made the targets appear farther from the observers, resulting in significant distance overestimation. Detection times and practice effects were not affected by use of the lenses. (Author)

**AD-622 345 Div. 6/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**ELECTRONIC PHOTOGUIDE,**

by L. V. Kasanfomaliti. 8 Oct 65, 6p. Rept. no. FTD-TT-65-1421
TT, 65-64137

Unclassified report

Unedited rough draft trans. of Astrofizicheskaya Observatoriya, Abastumani. Byulleten (USSR) n30 p137-8 1964.

Descriptors: (*Tracking telescopes, Television equipment), (*Television equipment, Tracking telescopes), Automatic, Photoelectric effect, USSR

A system is proposed for automatic tracking by telescope, based on the dissector LI-601 television transmitter tube.

**AD-622 414** **See Fld. 5/10**

**AD-622 715** **See Fld. 20/3**

## 17/9. RADAR DETECTION

**AD-622 493 Div. 6/6, 5/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**THREE DIMENSIONAL DISPLAY,**
by J. W. McIntyre. 17 Oct 63, 87p. Rept. no. CF-3056
Contract NOw62 0604c

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Stereoscopic display systems, Radar tracking), Systems engineering, Synchros, Lighting equipment, Optics, Timing circuits, Control systems, Monitors, Data storage systems

A three dimensional visual display has been developed. A time variable optical object plane is imaged on a vertical rotating display screen to generate the three dimensional space. The object plane generation is periodic and synchronized to display screen rotation. Dynamic trajectory insertion into a permanent memory capable of storing approximately 40,000 independent data points is available. An erasing feature is provided to allow removal and/or reinsertion of an established engagement situation. (Author)

**AD-622 666 Div. 6/6, 5/5, 30/2**
**CFSTI Prices: HC $4.00 MF $1.00**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**HAYSTACK POINTING SYSTEM: INTERCOM.**
Technical note,
by Arthur A. Mathiasen, and John D. Drinan. 9 Sep 65, 188p. Rept. no. TN-1965-39
Contract AF19 628 5167 Proj. 649L
ESD, TDR-65-424

Unclassified report

Descriptors: (*Space surveillance systems, Parabolic antennas), (*Parabolic antennas, Remote control systems), (*Intercommunication systems, Programming (Computers)), (*Command + control systems, Programming (Computers)), Radar antennas, Space communication systems, Antenna radiation patterns, Control systems, Digital computers, Control sequences, Compilers, Teletype systems, Typewriters

The Intercom program in the Haystack pointing system provides communications between the pointing system and an experimenter at Haystack using the console keyboardtypewriter. A user at the Millstone or the West Ford site may also direct the pointing system via a teletypewriter. The structure of the program, the calling sequence for it, and the conventions affecting the operator are described. (Author)

**AD-622 784 Div. 6/6, 2/1**
**CFSTI Prices: HC $4.00 MF $0.75**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**HAYSTACK POINTING SYSTEM: PRINTER PACKAGE.**
Technical note,
by Arthur A. Mathiasen, and John D. Drinan. 4 Oct 65, 122p. Rept. no. TN-1965-38
Contract AF19 628 5167 Proj. 649L
ESD, TDR-65-459

Unclassified report

Subcontracted to C. W. Adams Associates, Cambridge, Mass.

Descriptors: (*Space surveillance systems, Parabolic antennas), (*Parabolic antennas, Remote control systems), (*Command + control systems, Programming (Computers)), (*Programming (Computers), Space surveillance systems), Input-output devices, Printing, Radio astronomy, Tracking

The Printer Package is a set of general-purpose routines for: converting internally-stored numbers either in floating point, fixed point, integer, or octal form or alphanumeric strings to an output form suitable for printing; controlling format; and printing the output form. A user program by means of simple calling sequences can print virtually any information it has in a suitable form. The Printer Package and the user program are compiled together. (Author)

**AD-622 867 Div. 6/6, 15/1, 12/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY MISSILE TEST AND EVALUATION DIRECTORATE WHITE SANDS MISSILE RANGE N MEX FLIGHT SIMULATION LAB*
**A STATE VECTOR DERIVATION OF A DETERMINISTIC SIMULATION MODEL OF A RADAR TRACKER ON A ROTATING EARTH,**
by James S. Pappas, and Robert E. McDaniel. Apr 63, 37p. Rept. no. 56

Unclassified report

Descriptors: (*Mathematical models, Radar tracking), (*Radar tracking, Mathematical models), (*Vector analysis, Models (Simulations)), Matrix algebra, Rotation, Earth, Guided missile tracking systems

This report derives the deterministic math model for the flight simulation of a tracking radar (range, azimuth, and elevation) on a rotating earth. The basic motivation has been to obtain methods for mapping the geometrical vector equations to transfer-matrix equations for inclusion into the total system equations (forces, torques, guidance equations, etc) in state vector form. Matrix block diagrams are constructed to serve as a basis for studies into the design of matrix analog and digital computer programming. (Author)

**AD-623 017 Div. 6/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**HAYSTACK POINTING SYSTEM: MATHEMATICAL DEVELOPMENT FOR SATELLITES AND BELTS.**
Technical note,
by A. A. Mathiasen. 23 Sep 65, 36p. Rept. no. TN-1965-49
Contract AF19 628 5167 Proj. 649L
ESD, TDR-65-454

Unclassified report

Descriptors: (*Space surveillance systems, Parabolic antennas), (*Larabolic antennas, Space surveillance systems), (*Tracking, Space surveillance systems), (*Satellites (Artificial), Tracking), Orbital trajectories, Celestial mechanics, Position finding, Numerical methods and procedures

Satellites are implicitly completely described by their orbital elements. The conditions for going from the mean orbital elements of a satellite to osculating elements considering perturbations caused by the ellipsoidal earth, and then to celestial coordinates and their rates of change are derived. For belts, it is necessary to fix a point at which it is desired to direct an antenna. This is done by taking the intersection of a right-ascension half-plane, a geodetic longitude half-plane, a declination cone, or a time varying central angle vector with the belt. The equations for determining this point from the mean orbital elements and the intersecting surface or ray are derived. (Author)

**AD-622 320** **See Fld. 9/4**

**AD-622 410** **See Fld. 9/4**

**AD-622 441** **See Fld. 4/2**

**AD-622 810** **See Fld. 17/2**

## 18/4. NUCLEAR INSTRUMENTATION

**AD-622 303 Div. 20/6, 20/2, 20/5**
**CFSTI Prices: HC $6.00 MF $1.25**
*OAK RIDGE NATIONAL LAB TENN*
**DIFFERENTIAL FAST-NEUTRON ALBEDOS FOR CONCRETE. V. R SULTS ON MONTE CARLO CALCULATIONS FOR AN INCIDENT ANGLE OF 60 DEG,**
by R. E. Maerker. Jul 65, 236p. Rept. no. ORNL-3822 Vol. 5
Contract W7405eng26 Proj. DASA Order E0802 65, DASA Order E0800 64

Unclassified report

Descriptors: (*Albedo, Concrete), (*Fast neutrons, Albedo), Shielding, Reactor shielding calculations, Monte Carlo method, Integrals, Tables

Experimental and calculated differential fast-neutron albedos for concrete are presented for an incident angle of 75 degrees. The experiment was conducted at the ORNL Tower Shielding Facility and consisted of measuring neutrons reflected at various angles from a concrete slab which had been placed in a highly collimated beam of neutrons from the TSR-II (four angles of incidence). The calculations were performed with the 05R Monte Carlo computer code and covered six different source energy bands for each angle of incidence of a 'gun barrel' source of monodirectional neutrons.

**AD-622 329 Div. 20/6, 20/2, 20/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*OAK RIDGE NATIONAL LAB TENN*
**DIFFERENTIAL FAST-NEUTRON ALBEDOS FOR CONCRETE. I. DESCRIPTIONS OF MONTE CARLO CALCULATION AND TSF EXPERIMENT AND COMPARISON OF CALCULATED AND EXPERIMENTAL RESULTS,**
by R. E. Maerker, and F. J. Muckenthaler. Oct 65, 47p. Rept. no. ORNL-3822 Vol. 1
Contract W7405eng26 Proj. DASA Order E0802 65, DASA Order E0800 64

Unclassified report

Descriptors: (*Albedo, Concrete), (*Fast neutrons, Albedo), Shielding, Reactor shielding calculations, Reactor shielding materials, Monte Carlo method

Monte Carlo calculations were carried out in great detail on the reflection properties of concrete for fast neutrons. The results are presented for the differential angular dose albedo for various inci-

dent-beam conditions and touches upon some of the other distributions calculated. The following formula represents the calculated differential angular dose albedo to better than 10% for about 95% of the values obtained and can be used to extend the results to the entire hemispherical range for both incident and reflected neutron velocity vectors. A comparison of the fast-neutron angular dose albedo calculations weighted by an incident spectrum previously measured at the Tower Shielding Facility with the results of a series of dose albedo measurements performed at the TSF shows a root mean square deviation from 147 combinations of the incident and reflected angles of 3.1%, with the largest single deviation being 9%. This excellent agreement shows that existing cross sections are adequate to calculate differential albedos to a high precision.

**AD-622 372 Div. 20/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY NUCLEAR DEFENSE LAB EDGEWOOD ARSENAL MD*
**AN EVALUATION PROGRAM FOR A RADIOACTIVE WASTE TREATMENT FACILITY,**
by Allen A. Thieme, Ernest W. Bloore, and Carl-Crisco. Oct 61, 21p. Rept. no. NDL-TM-4
Unclassified report

Descriptors: (*Radioactive waste, Processing), Disposal, Industrial plants, Radioactive isotopes, Liquids, Decontamination, Separation, Operations research, Performance (Engineering)

A facility for the concentration of low level radioactive liquid waste was designed and fabricated. Prior to releasing this facility for routine operation, an evaluation program was conducted. The objectives of the evaluation were to: (1) Determine the optimum operating conditions of the radioactive liquid waste treatment facility. (2) Determine the capabilities and limitations of this facility. (3) Determine the effect of the operating variables on the decontamination factor (DF) and concentration factor (CF).

**AD-622 636 Div. 20/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF*
**LOW DOSE MEASUREMENTS WITH MODIFIED SILVERPHOSPHATE GLASS DOSIMETER READER,**
by Cirel K. Menkes. 30 Aug 65, 44p. Rept. no. USNRDL-TR-889
Proj. SF011 05 11 Task 0503
Unclassified report

Descriptors: (*Dosimeters, Phosphate glass), Silver, Fluorescence, Optical filters, Light transmission, Gamma rays, Gamma ray spectra, Dose rate

Greater precision in measuring gamma-ray doses below 1.0 R with silver-activated phosphate glass was achieved by modification of the Toshiba FGD-3B Fluoro Glass Dosimeter Reader. Twenty-five milliroentgen (25 mR) was read on 6 mm x 6 mm x 3.3 mm glass square dosimeters with an accuracy of about 5%, suggesting that results of this precision should be obtainable with more sensitive glass dosimeters down to 10 mR or less. Fluorimetric emission spectra and measurements made after replacement of the red filter by a yellow filter in the Toshiba reader indicate that the predose of Toshiba silver phosphate glass has a relatively significant fluorescence in the region of the irradiation-induced fluorescence. (Author)

**AD-622 670 Div. 20/6 ,30/3**
*OESTERREICHISCHE STUDIENGESELLSCHAFT FUER ATOMENERGIE G M B H SEIBERSDORF PHYSICS INST*
**INTENSITY, BACKGROUND AND RESOLUTION WIDTH IN NUCLEAR COUNTING EXPERIMENTS,**
by G. Quittner. 30 Jun 64, 7p. Contract AF61 052 638
AFOSR , 65-1371
Unclassified report

Pub. in Nuclear Instruments and Methods v31 p61-7 1964 (Copies available only to DDC users).

Descriptors: (*Radiation measurement systems, Errors), Intensity, Background, Resolution, Radioactivity, Statistical analysis, Count-rate meters, Inelastic scattering, Thermal neutrons

Some formulas for the evaluation of nuclear counting experiments with regard to their statistical accuracy are developed. Three types of measurements are considered: (1) simple counting, (2) location measurements, (3) intensity distribution measurements. The relation of the statistical uncertainty to other sources of error is discussed briefly, leading to the matching principle. Examples are drawn mainly from the field of inelastic scattering of thermal neutrons. (Author)

**AD-622 726 Div. 20/6 ,4/4**
*DEFENCE CHEMICAL BIOLOGICAL AND RADIATION LABS OTTAWA (ONTARIO)*
**A L.E.T. INDEPENDENT DOSIMETER BASED ON THE CHEMILUMINESCENT DETERMINATION OF H2O2,**
by W. A. Armstrong, and W. G. Humphreys. 21 Apr 65, 11p. Rept. no. DCBRL-461
Unclassified report

Pub. in Canadian Journal of Chemistry v43 p257684 1965 (Copies available only to DDC users).

Descriptors: (*Hydrogen peroxide, Luminescence), (*Dosimeters, Hydrogen peroxide), (*Luminescence, Dosimeters), Photochemistry, Water, Catalysis, Copper, Spectroscopy, Gamma rays, Hydrazones, N-heterocyclic compounds

A sensitive method for the determination of H2O2 based on the copper-catalyzed chemiluminescent reaction between luminol and H2O2 was developed. The integral luminescence measured with a modified spectrophotofluorometer was found to increase linearly with concentration for 3 x 10 to the 8 to 1.5 x 10 to the 5 M H2O2 solutions. This method was applied to the determination of H2O2 formed in irradiated water and it was shown that this system may be used as a dosimeter in the range 30 to 3 000 rads. The following values were obtained for the initial H2O2 yields: G (H2O2) = 1.22 = 0.07 for gammaradiation, 1.28 = 0.09 for 250 kVcp (105 KeV effective) X-radiation and 1.31 = 0.04 for 14 MeV neutrons. These results and those of other workers demonstrate that the initial yield of H2O2 in aerated water increases only by about 15% for an increase in radiation l.e.t. of 0.02 to 14eV/A. (Author)

**AD-622 616** **See Fld. 8/10**

## 18/8. RADIOACTIVITY

**AD-622 629 Div. 20/3 ,22/7 ,30/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*HARRY DIAMOND LABS WASHINGTON D C*
**A NUCLEAR TIME BASE-FEASIBILITY STUDY,**
by Duane E. Voeller. 12 Aug 65, 50p. Rept. no. TR-1300
Proj. DA1N523801A300 ,HDL46300
Unclassified report

Descriptors: (*Timing devices, Alpha counters), (*Alpha particle detectors, Timing devices), (*Radioactive decay, Alpha particle detectors), (*Radiation measurement systems, Timing devices), Radioactive isotopes, Alpha particles, Counting methods, Time, Standards, Clocks, Amplifiers, Voltage, Discriminators, Semiconductor devices, Ordnance, Feasibility studies

An investigation has been made to determine the feasibility of using random disintegration events of a radioactive isotope in conjunction with a nuclear particle detector as a low-frequency, high-accuracy time base for an electronic timer. The objectives were directed toward a time base suited for various ordnance applications. This report reviews the various types of detection devices and radioisotopes that were considered; also, it includes test data from the time base that was subsequently developed. The time base evolving from this study consists of an alpha particle source, a semiconductor nuclear particle detector, and a preamplifier with voltage discriminator. A timing error of < 0.1 percent was obtained with this system within a -55 to +75C range. Using integrated electronics, the system could be packaged within 1 cu in. and consume < 25 mW. Based on this investigation, the use of random disintegration events of a radioisotope in conjunction with a nuclear particle detector has been determined feasible but impractical at present, because of the long calibration time and relatively expensive associated electronics. (Author)

**AD-622 790 Div. 20/3 ,14/2 ,14/8 ,17/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*RADIATION EFFECTS INFORMATION CENTER COLUMBUS OHIO*
**RADIATION EFFECTS INFORMATION CENTER MONTHLY ACCESSION LIST. ABSTRACT NO. 28653 TO 28722, PART I.**
Rept. for 1 Sep-30 Sep 65.
10 Oct 65, 29p. Rept. no. reic al-91
Contract AF33 615 1124
Unclassified report

Continuation of contract AF33 657 10085.

Descriptors: (*Bibliographies, Radiation damage), (*Radiation damage, Materials), (*Materials, Radiation damage), Abstracting, Radiation chemistry, Ceramic materials, Metals, Organic materials, Polymers, Electronic equipment, Space environmental conditions, Test methods, Radiation measurement systems

Table of contents: Dates Covered: September 1, 1965 to September 30, 1965, metallic materials; ceramic materials; organic materials; polymeric materials; inorganic materials; electronic materials, components, and devices; facilities; space environment and effect on materials; experimental devices and techniques; miscellaneous.

**AD-622 791 Div. 20/3 ,14/2 ,14/8 ,17/5**
**CFSTI Prices: HC $3.00 MF $1.00**
*RADIATION EFFECTS INFORMATION CENTER COLUMBUS OHIO*
**RADIATION EFFECTS INFORMATION CENTER DUAL COORDINATE INDEX FOR ACCESSION LISTS NUMBER 80, OCTOBER 1, 1964 TO NUMBER 91, SEPTEMBER 30, 1965.**
10 Oct 65, 95p. Rept. no. 80-91
Contract AF33 615 1124
Unclassified report

Continuation of Contract AF33 657 10085. See also AD-609 004, AD-610 785, AD-612 102, AD-612 104, AD-613 591, AD-614 985, AD-616 247, AD-617 722, AD-619 002, AD-622 790.

Descriptors: (*Indexes, Radiation damage), (*Materials, Radiation damage), (*Radiation damage, Materials), (*Bibliographies, Radiation damage), Radiation chemistry, Ceramic materials, Metals, Organic materials, Plastics, Electronic equipment, Space environmental conditions, Radiation measurement systems

**AD-622 974 Div. 20/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**PULSED NUCLEAR RADIATION EFFECTS ON RESISTORS AND CABLES, SPRF IV,**

by Charles P. Lascaro, William Schlosser, and Joseph Newberg. Dec 64, 39p. Rept. no. ECOM-2545
Proj. 1C0 24401A112 Task 1C0 24401A112 05
Unclassified report

Descriptors: (*Resistors, Radiation damage), (*Electric cables, Radiation damage), (*Relaxation oscillators, Radiation damage), (*Radiation damage, Electronic equipment), Coaxial cables, Circuits, Attenuation, Transients, Resistance (Electrical), Reliability (Electronics), Dielectrics, Modules (Electronics), Microminiaturization (Electronics)

Various cable and resistor types and an operating micromodule multivibrator circuit were exposed to a pulsed nuclear radiation environment (SPRF) and their transient response measured during the pulse. The initial RG-59 B/U cable response was determined to be voltage dependent and averaged 0.15 microamps per volt superimposed on a zero voltage 'replacement' current of -15 microamps. A miniature low noise cable, with conductive interfaces, gave the lowest and most stable response of all cables tested. The attenuation of three different types of RF cables was measured and the signal in JT-205 with foamed polyethylene was attenuated approximately 20%. The US-DEV -15 cable with perforated tape teflon averaged 0.3% and for RG-8 A/U, a solid polyethylene dielectric, attenuation averaged 0.5%. Carbon composition, deposited carbon film, nichrome film, tin oxide, wirewound, cermet, and gasfilled 'Minuteman' resistors of various wattages were tested in an unpotted, conformally coated, and potted condition. All low value resistors tested (less than 1500 ohms) maintained tolerance levels even in unpotted conditions. For the unpotted higher-value resistors (10 K ohm) the shunting effect of the ionized air may cause a resistance change of the order of 2% which can be reduced to 1% by conformal coating. The 100 K ohm 'Minuteman' gas-filled resistor showed an effective decrease of 7% during exposure. (Author)

**AD-623 078 Div. 20/3 ,8/2**
**CFSTI Prices: HC $5.00 MF $1.00**
*NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF*
**THE INFLUENCE OF TEMPERATURE ON RADIATIONINDUCED SURFACE EFFECTS IN TRANSISTORS,**
by Clarence F. Ramstedt, Harry A. Zagorites, and Dan Y. Lee. 5 Aug 65, 176p. Rept. no. USNRDL-TR-885
Proj. SR007 11 01 Task 0551
Unclassified report

Descriptors: (*Transistors, Radiation damage), (*Radiation damage, Transistors), Temperature, Surface properties, Germanium, Silicon, Gain, Electric currents, Electrical impedance

Tests were performed to determine the influence of junction temperature on radiation-induced surface effects in transistors. Sets of the germanium transistor types 2N526, 2N501A, 2N43A and 2N599 and the silicon transistor type 2N329A were irradiated to an exposure of 13,100 r in controlled ambient temperatures of 0, 25, and 50C while individual I sub CBO (collector leakage current), Beta (common emitter current gain) and h sub ie (common emitter input impedance) levels were measured. The responses, predominantly upward, were shown to be significantly dependent on junction temperature. The radiation-induced changes in I sub CBO (delta I sub CBO) increased with temperature in all units up to a point, above which, in three Ge types, they decreased. Induced changes in gain (delta beta) showed no consistent temperature influence; but, analysis of the common base gain, alpha, showed changes (delta alpha) which decreased consistently with temperature in the Ge transistors and over a portion of the temperature range in the Si transistor. The responses of h sub ie generally followed those of beta. Thermal annealling of radiation effects appears responsible for the diminishing of delta alpha and delta I sub CBO with temperature. Post-irradiation recovery rates of delta I sub CBO increased with temperature and correlated with the delta I sub CBO vs temperature relations. No correlation could be established between the delta or delta beta vs temperature relation and the post-irradiation recovery rate of current gain. (Author)

**AD-622 334 See Fld. 21/9**

**AD-622 616 See Fld. 8/10**

**AD-622 623 See Fld. 4/2**

**AD-622 649 See Fld. 21/9**

**AD-622 858 See Fld. 20/8**

## 18/9. REACTOR ENGINEERING AND OPERATION

**AD-622 327 Div. 20/5**
**CFSTI Prices: HC $5.00 MF $1.00**
*NAVAL ORDNANCE LAB WHITE OAK MD AIR/GROUND EXPLOSIONS DIV*
**EXPLOSION CONTAINMENT LAWS FOR NUCLEAR REACTOR VESSELS.**
Final rept. for 1956-64,
by W. R. Wise Jr., and J. F. Proctor. 16 Aug 65, 156p. Task NOL285
NOLTR , 63-140
Unclassified report

Descriptors: (*Power reactors, Containment), (*Containment, Reactor accidents), (*Nuclear explosions, Containment), Reactor cores, Urban areas, Reactor safety systems, Cylindrical bodies, Structural properties, Loading (Mechanics)

The location of power reactors in urban areas increases the need for containment of the maximum credible nuclear accident. Such an accident could possibly involve a large and rapid energy release in the core region due to a nuclear excursion. To contain the energy release (and any subsequent release of fission products), the integrity of the reactor primary vessel is very important. To investigate this integrity, extensive theoretical and experimental analyses were performed, and basic explosion containment laws for water-filled right-circular cylinders were formulated and verified for a wide range of vessel materials and sizes. These laws express explosive charge weight as a function of vessel geometry and conventional material properties. The basic containment laws were amplified to characterize the response of reactor primary vessels to a large spectrum of postulated nuclear accidents. Included in the study are experimental data on the effects upon containment of weldments, nozzles, and end constraints. (Author)

**AD-622 303 See Fld. 18/4**

**AD-622 329 See Fld. 18/4**

**AD-622 815 See Fld. 20**

## 19/1. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

**AD-622 633 Div. 22/10,30/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*HARRY DIAMOND LABS WASHINGTON D C*
**USE OF SLED TESTS TO OBTAIN CLOSE-RANGE RADAR SIGNATURES,**
by Ara Mesrobian, and Ross Parkhurst. 16 Aug 65, 24p. Rept. no. TM-65-39
Proj. DA 1X242106D676 ,HDL 56400
Unclassified report

Descriptors: (*Proximity fuzes, Aircraft interception), (*Rocket-propelled sleds, Proximity fuzes), (*Radar echo areas, Test methods), Performance (Engineering), Tests, Test equipment, Target acquisition, Tracking cameras, Antenna radiation patterns, Telemetering data

A rocket sled has been successfully used to determine air-target proximity fuze performance under actual encounter conditions. Feasibility of the sled test was proved in 21 runs, with the fuze mounted on or in the rocket sled. These tests were conducted at the U. S. Naval Ordnance Test Station (China Lake, California), using the NOTS B-4 track. Tape recordings were made of each run and accurate signatures obtained from the various targets suspended above the track. This report includes a detailed description of the instrumentation and techniques used in the sled tests, as well as how the test data were analyzed. (Author)

**AD-622 693 Div. 22/1**
**CFSTI Prices: HC $3.00 MF $0.50**
*TORONTO UNIV (ONTARIO) INST FOR AEROSPACE STUDIES*
**SHOCK AND COMBUSTION-WAVE DYNAMICS IN AN IMPLOSION-DRIVEN HYPERVELOCITY LAUNCHER.**
Final rept. for 20 Jul 65,
by Irvine I. Glass. Aug 65, 51p. Rept. no. UTIAS-R-25
Contract AF33 657 7874 Proj. 7065
ARL , 65-162
Unclassified report

Descriptors: (*Hypervelocity projectiles, Launching), (*Explosions, Dynamics), Shock waves, Combustion, Models (Simulations), Aerodynamic configurations, Detonations, Deflagration, Propellants, Enthalpy, Pressure, Oxygen, Hydrogen, Helium, Hypervelocity guns, Canada

In order to solve many existing problems in planetary entry it is necessary to have facilities that are capable of launching undamaged projectiles at hypervelocities in excess of 50,000 ft/sec. Unfortunately, conventional lightgas guns appear to have reached a velocity plateau of about 30,000 ft/sec or less for launching integral aerodynamic models. It is shown that by a novel application of combustion-wave and shock-wave dynamics in gases and explosives that it is theoretically possible to achieve projectile velocities in the desired hypervelocity range. Some details are presented of the analysis, facility, and the research results obtained to date on spherical combustion of stoichiometric mixtures of oxygen and hydrogen diluted with helium or hydrogen, the initiation of propellants and explosives by using deflagration and detonation waves, and some initial launchings. (Author)

**AD-623 085 Div. 22/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF*
**EFFECTS OF VELOCITY AND MATERIAL PROPERTIES ON DESIGN LIMITS FOR LINEAR SHAPED CHARGES,**
by Robert G. S. Sewell. Oct 65, 10p. Rept. no. NOTS-TP-3894
Task RMM042 994 216 1F008 08 06
NAVWEPS , 8793
Unclassified report

Descriptors: (*Shaped charges, Design), Linear systems, Shaped charge jets, Velocity, Steel, Copper, Configuration

This report discusses the design limits for linear shaped charges that are caused by the behavior properties of the linear shaped charge. In the study the jetting process for both mild steel and copper is examined. (Author)

## 19/4. EXPLOSIONS, BALLISTICS, AND ARMOR

**AD-622 783 Div. 22/4**
**CFSTI Prices: HC $4.00 MF $1.00**
*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF*
**BALLISTIC HANDBOOK.**
Rept. for Feb 63-Mar 65,
by R. B. Seeley, and Roy Dale Cole. Aug 65, 139p. Rept. no. NOTS-TP-3902
Task R520 00 001 216 1F018 02 03, RAV08N001 2161S171 00 01

Unclassified report

Descriptors: (*Ballistics, Handbooks), Weapon systems, Fire control systems, Statistical data, Nomographs, Trajectories, Systems engineering

The handbook contains, in a variety of forms, ballistic information on free-fall, unguided weapons of all types, and is intended for use by those engaged in weapon design, fire control system design, and weapon system analysis. The ballistic information is presented in the form of ballistic trajectory equations, tables, graphs, and nomographs, from which many trajectory parameters of interest can be quickly obtained with accuracy sufficient for design and analysis purposes. (Author)

**AD-622 842 Div. 22/6 ,9/2 ,10/7**
*CALIFORNIA UNIV BERKELEY COLL OF ENGINEERING*
**ON THE DYNAMICS OF THE DEVELOPMENT OF DETONATION IN A GASEOUS MEDIUM,**
by A. K. Oppenheim. 1964, 24p. Contract AF AFOSR129 64 Proj. 9711 Task 971101 AFOSR , 65-1480

Unclassified report

Pub. in Archiwum Mechaniki Stosowanej v2 n16 p40324 1964 (Copies available only to DDC users).

Descriptors: (*Detonations, Fluid dynamic properties), (*Gas flow, Detonations), (*Explosive gases, Detonations), Flames, Shock waves, Combustion, Vector analysis, Explosions, Propagation

An elementary gasdynamic treatment is made of two problems of detonation analysis: (1) the generation of the pressure wave by the flame kernel, and (2) the interaction between various pressure waves and combustion fronts. In regard to the first problem, two models are presented which represent the lower and upper bounds respectively for the gasdynamics solution of a flow field generated by the initial growth of a flame kernel in an explosive gas. The second problem is analyzed by a graphical technique, the vector polar method. It is concerned only with effects in the large and can be considered as the generalization of the method of characteristics to finite wave interaction processes. (Author)

**AD-622 980 Div. 22/6 ,13/4 ,2/10 ,30/3**
**CFSTI Prices: HC $3.00 MF $0.75**
*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF*
**THE BLAST ENVIRONMENT: METHODOLOGY AND INSTRUMENTATION TECHNIQUES WITH APPLICATIONS TO NEW FACILITIES.**
Technical publication,
by E. A. Zeitlin. Aug 65, 91p. Rept. no. NOTS-TP-3870
NAVWEPS , 8782

Unclassified report

Descriptors: (*Blast, Loading (Mechanics)), (*Structures, Blast), Shock waves, Stresses, Measurement, Aerodynamic characteristics, Airburst, Structural properties, Test equipment, Combustion, Vibration, Seismology, Dynamics, Instrumentation, Earthquakes

The report reviews and summarizes the blast characteristics usually considered in engineering studies in terms of blast aerodynamic forces and the commonly accepted scaling laws. The similarity and points of difference between blast and earthquake forces are discussed. The equations of structural dynamics, vibration characteristics, and basic types of available instruments are examined as a part of a unified dynamic system consisting of the test structure, pickup devices, and recording methods. (Author)

**AD-623 034** **See Fld. 19/5**

## 19/5. FIRE CONTROL AND BOMBING SYSTEMS

**AD-622 471 Div. 22/7 ,24/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**SYMPLCORDER: SYNCHRO METER POLAROID LAND CAMERA RECORDER FOR FCS DATA INDICATION AND RECORDING,**
by F. A. Oyhus. 10 Aug 64, 14p. Rept. no. CF-3102

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Fire control systems, Display systems), (*Photographic recording systems, Display systems), Circuits, Voltmeters, Synchros, Cameras

Specifications for the SYMPLCORDER are given. The SYMPLCORDER is a passive circuit device designed to indicate significant FCS functions in a convenient manner for observation and photo-recording. It employs high impedance synchros and meters plus status indicator lamps for maximum simplicity and adequate accuracy with minimum size, weight and cost.

**AD-623 034 Div. 22/7 ,22/4 ,2/7 ,18/4**
*ARMY ELECTRONICS LABS FORT MONMOUTH N J*
**AN ARMY ATMOSPHERIC SOUNDING SYSTEM.**
Revised ed.,
by J. A. Siderman, A. C. Peterson, and R. L. Robbiani. 12 Nov 64, 10p.

Unclassified report

Pub. in IEEE Transactions on Military Electronics p153-62 Apr 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript received 24 Oct 64.

Descriptors: (*Atmospheric sounding, Army operations), (*Meteorological instruments, Atmospheric sounding), (*Ballistics, Meteorology), Army research, Artillery, Fire control systems, Weather forecasting, Mobile, Weather stations, Telemeter systems, Data processing systems, X band, S band, Radiosondes

Atmospheric sounding systema have become one of the most important meteorological tools to both the civilian and military population. The Meteorological Data Sounding System (MDSS), described in the manuscript, is the newest type and provides accuracies, capabilities, and features not available in any of the atmospheric sounding systems currently in use. The MDSS is being designed for the Army in support of artillery fire. The purpose of the MDSS system is to provide the capability to artillery sections for obtaining a first round hit, even in areas obscured from observers, by the use of the most reliable, fresh, and comprehensive meteorological data. These data are obtained through the unique technique of using an S-band frequency for meteorological and angular data acquisition and an X-band frequency for ranging on an airborne target. The target is part of the radiosondeflight train. All the meteorological and geometric data are fed to a radiosonde data processor which converts all the parameters into a common, machine language form for computer processing. In addition to the system's excellent mobility and quick reaction capabilities, it is capable of obtaining sounding data and processing it at an extremely high rate. The final output data is produced in the form of seven types of meteorological messages which are used for decision making by field commanders and missile test ranges. (Author)

**AD-622 629** **See Fld. 18/8**

**AD-622 630** **See Fld. 9/1**

## 19/6. GUNS

**AD-622 559 Div. 22/8 ,14/7 ,14/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*SPRINGFIELD ARMORY MASS*
**FRICTIONAL AND WEAR CHARACTERISTICS OF VARIOUS COATINGS USED ON SMALL CALIBER WEAPON COMPONENTS.**
Technical rept.,
by M. A. George. 17 Sep 65, 30p. Rept. no. SR-TR18 1089
Proj. MI 4 50020 01M1M6

Unclassified report

Descriptors: (*Coatings, Gun components), (*Gun components, Coatings), (*Wear resistance, Coatings), Friction, Protective treatments, Small arms, Phosphate coatings, Chromium, Aluminum, Steel, Metal coatings, Hardness, Lubricants, Graphics

Friction and wear studies, in which Springfield Armory friction and wear machine was used, were continued. Information relating to the frictional and wear properties of coatings was obtained under simulated weapon conditions. Various coatings such as phosphate, chromium plate, and hard-anodized aluminum were evaluated. The rough porous coatings such as phosphated steel and hardanodized aluminum generally had high coefficients of friction when unlubricated, but exhibited good wear resistance when lubricated. Chromium plate, when unlubricated, had a lower coefficient of friction than steel of equal surface roughness. Metallic surfaces such as chromium plate and hardened steel had limited antigalling properties. Procedure is given, and results are discussed. (Author)

## 19/8. UNDERWATER ORDNANCE

**AD-622 378** **See Fld. 21/7**

## 20. PHYSICS

**AD-622 815 Div. 20/9 ,20/5 ,25/3**
**CFSTI Prices: HC $6.00 MF $1.25**
*STEVENS INST OF TECH HOBOKEN N J DEPT OF PHYSICS*
**MEGATRON ACCELERATOR.**
Final rept. for 15 Apr 61-15 Jun 64,
by K. C. Rogers, S. J. Lukasik, and L. Ferrari. 15 Jun 64, 242p. Rept. no. SIT-P147 (5/65)
Contract DA36 039sc87242E Proj. 1P0 14501B11A,ARPA Order112 62 Task 1P0 14501B11A00

Unclassified report

Descriptors: (*Betatrons, Plasma jets), (*Plasma jets, Betatrons), Electron beams, Electron accelerators, Plasma oscillations, Magnetic fields, Particle accelerator techniques

The Megatron (plasma betatron) Project is discussed. Construction details of the accelerator are given, and methods of shaping and measuring the magnetic guide field are described. Methods of generating the plasma and its initial properties are listed. Application of the timevarying magnetic guide field results in the production of a runaway electron beam of peak energy 1 Mev and beam intensity approximately one ampere. Methods of detecting the runaway electrons are described, and the electron life histories are studied. It is found that ultimate destruction of the runaway electron beam results from a collective interaction of the beam electrons and the background plasma. The observations are compared with theoretical results of Field and Fried. Also included are the results of a computer study of early time collective effects in a cold plasma subjected to a rapidly rising betatron guide field. (Author)

## 20/1. ACOUSTICS

**AD-622 710 Div. 25/1 ,8/7**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS DATA SCIENCES LAB*
**VOCAL-RESPONSE SYNTHESIZER.**
Instrumentation papers,
by Caldwell P. Smith. 8 Oct 64, 10p. Rept. no. IP-76
Proj. 4610 Task 461002
AFCRL , 65-642
Unclassified report

Pub. in Journal of Acoustical Society of America v37 n1 p170-1 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Acoustics, Speech), (*Speech, Bionics), (*Bionics, Speech), (*Communication theory, Speech transmission), Sound generators, Waveform generators, Sound pitch, Modulation, Oscillators

A new speech synthesizer is described. Instead of bandpass filters, it uses oscillators whose phase, frequency, and amplitude can be modulated pitch-synchronously. (Author)

**AD-622 947 Div. 25/1 ,2/9**
*RENSSELAER POLYTECHNIC INST TROY N Y*
**COVARIANCE OF SURFACE-GENERATED NOISE IN A DEEP OCEAN,**
by W. S. Liggett,Jr., and M. J. Jacobson. 1965, 11p. Rept. no. RPI-MATHREP-70
Contract Nonr59109
Unclassified report

Pub. in The Journal of the Acoustical Society or America v38 n2 p303-12 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Noise, Analysis of variance), (*Oceans, Sound transmission), Noise generators, Green's function, Boundary value problems, Differential geometry

The space-time covariance of surface-generated noise is investigated using a model that assumes that the covariance of the pressure is specified for all pairs of points on a plane and that the acoustic pressure satisfies a wave equation with constant coefficients in the semiinfinite region below this plane. It is shown that one may imagine the noise to be generated by a plane distribution of statistically dependent dipole sources. Alternatively, one may imagine dependent omnidirectional sources if the surface covariance of the normal derivative of the pressure is specified. A second noise model employs ray theory and supposes that the noise is generated by a plane distribution of statistically independent directional point sources. The covariance functions predicted by the two models at points in deep water are compared and are shown to be equal when the covariance on the plane of the first model is properly related to the source directionality in the second model. This relationship allows us to specify a surface covariance function for a given source directionality and conversely. Surface covariance functions corresponding to the common source directionalities are investigated, and directionality is examined for Gaussian surface covariance. (Author)

**AD-622 979 Div. 25/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL RESEARCH LAB WASHINGTON D C*
**APPLICATION OF THE FRESNEL METHOD TO THE CALCULATION OF THE RADIATED ACOUSTIC FIELD OF RECTANGULAR PISTONS,**
by Werner G. Neubauer. 23 Sep 65, 18p. Rept. no. NRL-6286
Proj. RF101 03 45 5252
Unclassified report

Descriptors: (*Sound, Mathematical analysis), Acoustics, Rectangular bodies, Pistons, Integrals

Radiation from a uniformly vibrating rectangular piston in an infinite rigid baffle is expressed by an approximate solution in terms of the complex Fresnel integral. Although a similar approximate method has been used by others, the solution given here allows evaluation of a larger region of the field than do previous solutions. Field values for the specific cases of a wavelength by 2 wavelength piston and a 2 wavelength by 4 wavelength piston are computed and compared for three methods of solution, namely, the present method, an analogous method by Freedman ('Sound Field of a Rectangular Piston', J. Acoust. Soc. Am. 32:197 (1960)), and the Huygens construction. Favorable comparison is found between the present solution and the less approximate but more complicated solution employing a finite Huygens construction. Also, the present results are in essential agreement with Freedman's near the central axis of the piston. Thus, accurate field values can be derived, using the theory which is given, by the use of the tabulated Fresenel integral or by a graphical method using the Cornu spiral. The accuracy of these derived values vary with field position, but an estimate of the accuracy may be made by comparison with the specific cases which are given. (Author)

**AD-623 015 Div. 25/1 ,6/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVY UNDERWATER SOUND LAB NEW LONDON CONN*
**A REVIEW OF THE U. S. NAVY UNDERWATER SOUND LABORATORY'S ISO-LOSS CONTOUR PROGRAM.**
Research rept.,
by Lloyd T. Einstein. 19 Oct 65, 23p. Rept. no. USL-708
Proj. SF001 0102 Task 11276
Unclassified report

Descriptors: (*Underwater sound, Sound transmission), (*Sound transmission, Underwater sound), (*Acoustics, Underwater sound), Sound signals, Propagation, Vector analysis, Curve fitting, Hydrographic sonar, Naval research, Caribbean Sea

The current status of sound field prediction at the U. S. Navy Underwater Sound Laboratory is described. A raytracing program has been written which produces iso-loss and iso-anomaly contours for a cylindrically symmetric, layered medium, with the gradient held constant within each layer. A simplifying prediction tool applicable in this situation, the F-line, is described. Predicted sound field discontinuities produced by rays that vertex near break-points in the velocity-depth structure are discussed. (Author)

**AD-623 086 Div. 25/1 ,27/2 ,16/10**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB OHIO*
**NEARFIELD INFRASONIC NOISE GENERATED BY THREE TURBOJET AIRCRAFT DURING GROUND RUNUP OPERATIONS.**
Final rept. for Jun-Aug 64,
by Robert T. England, and Robert G. Powell.
Aug 65, 25p. Rept. no. AMRL-TR-65-132
Proj. 7231 Task 723104
Unclassified report

Descriptors: (*Jet engine noise, Acoustic properties), (*Turbojet engines, Noise), (*Noise, Turbojet engines), (*Acoustics, Jet engine noise), Airplanes, Taxiing, Take-off, Sound, Low frequency, Thresholds (Physiology), Measurement, Acoustic equipment

Acoustic measurements in the frequency range between 4.5 to 4500 cycles per second were made on the near field sound pressure environment produced by the F-101B, NF-102A, and F-106A turbojet aircraft during ground runup operations. Results from twentyeight microphone locations show that the maximum infrasonic noise below audio frequency range is generated downstream from the exhaust nozzle and at engine settings producing maximum turbulent flow. (Author)

**AD-622 321 See Fld. 9/4**

**AD-622 720 See Fld. 20/4**

**AD-622 823 See Fld. 8/10**

**AD-622 824 See Fld. 7/4**

## 20/2. CRYSTALLOGRAPHY

**AD-622 323 Div. 25/2 ,4/2 ,25/6**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**EFFECT OF TRIVALENT MANGANESE ON THE CRYSTAL CHEMISTRY OF SOME LITHIUM SPINELS,**
by D. B. Rogers, R. W. Germann, and R. J. Arnott. 23 Dec 64, 5p.
Unclassified report

Pub. in Journal of Applied Physics v36 n8 p233842 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lithium compounds, Spinels), (*Spinels, Impurities), (*Manganese, Magnetic properties), (*Magnetic core storage, Magnetic materials), Crystal structure, Crystal lattice defects, Ferrites, Hysterisis, Gallium compounds, Aluminum compounds, Manganates, Perturbation theory

Crystallographic properties of the spinel systems Li0.5Ga2.5-xMnxO4 (0< or = x < = 0.7), Li0.5Fe2.5-xMnx O4 (0< or = x < or = 0.5), and Li0.5A12.5-x MnxO4 (0< or = x< or = 0.5) were investigated in order to determine the effects of trivalent manganese substitution on the crystal chemistry of the ordered spinel hosts. In each system relatively small concentrations of Mn (3+) removed long-range ordering of lithium ions on the octahedral sites. This loss of order was accompanied by anomalies in the dependence of lattice parameters on composition. These observations can be qualitatively interpreted by assuming that Mn (3+) ions tend to cluster in order to reduce the elastic energies associated with Jahn-Teller stabilization. These effects may provide indirect evidence for lattice imperfections such as have been invoked to account for square B-H hysteresis loops in ferrite materials containing Jahn-Teller ions. (Author)

**AD-622 430 Div. 25/2 ,11/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*OWENS-ILLINOIS TECHNICAL CENTER TOLEDO OHIO*
**SOME STUDIES ON MONOCLINIC ZIRCONI-**

**UM DIOXIDE FROM ROOM TEMPERATURE TO 1095C.**
Final rept. for Jan-31 Dec 64,
by S. M. Lang, E. W. Franklin, and N. J. Tylutki.
Jul 65, 32p. Contract AF33 615 1258 Proj. 7022 Task 702202
ARL , 65-140

Unclassified report

Descriptors: (*Zirconium compounds, Dioxides), (*X-ray diffraction analysis, Zirconium compounds), Transformations, Silicon compounds, Oxides, Crystallography, Impurities, Crystal lattices

High-temperature x-ray diffractometry was used to investigate on e of the mechanisms proposed for the monoclinic-to-tetragonal transformations of ZrO2 and to demonstrate the necessity for recognizing, and eliminating or substantially reducing, the uncertainties of various experimental parameters; particularly those associated with material characterization and precision diffraction measurements. A number of previously unresolved low-angle monoclinic ZrO2 diffraction maxima are reported. It was shown that the SiO2-ZrO2 phase equilibrium diagram requires modification to account for 0.1 to 0.3 wt% of zircon as a stable impurity phase. Strain relaxations in monoclinic ZrO2 near, but below, the transformation temperature could not be detected. The diffraction data obtained were used to calculate axial expansion data between 28 and 1095C. The evaluation of the deviations between observed and calculated diffration maxima locations and assignment of reliable test temperature values required precise diffraction measurements and calculation methods. The latest instrumental alignment modifications required to obtain the necessary diffraction data are reported. The method for calculating exact monoclinic system crystallographic constants values is described. (Author)

**AD-622 496 Div. 25/2 ,25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY ELECTRONICS COMMAND FORT MONMOUTH N J*
**DEPENDENCE OF THE ELECTRICAL RESISTIVITY OF FERROCENE SINGLE CRYSTALS ON DISLOCATIONS.**
Technical rept.,
by Claire Loscoe. Jul 65, 11p. Rept. no. ECOM-2619
Proj. DA1P6 22001A056 Task DA1P6 22001A056 03 04

Unclassified report

Descriptors: (*Ferrocenes, Resistance (Electrical)), (*Single crystals, Ferrocenes), Crystal lattice defects, Semiconductors

Etch pits were obtained on the surfaces of ferrocene single crystals, which were grown from solution of benzene and ferrocene, by two methods: simple evaporation in air and, etching in methyl alcohol. For each sample, the etch pit density (N) which indicates the number of dislocations in the crystals, was determined on the (001) surface of the crystals, and the resistivity was measured in a direction perpendicular to this face. The resistivity is found to be greater for samples with greater etch pit density, and may be expressed as resistivity = AN (3.3), where A is a constant. (Author)

**AD-622 512 Div. 25/2 ,17/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*CALIFORNIA UNIV LOS ANGELES DEPT OF ENGINEERING*
**A STUDY OF THE GROWTH MECHANISMS OF ALLOY FILAMENTARY CRYSTALS (WHISKERS) GROWN FROM THE SOLID.**
Technical rept.,
by George H. Sines, Daniel Rosenthal, William D. Hanna, and Alan M. Nakashima. Aug 65, 13p. Rept. no. 65-36
Contract Nonr23377 Proj. NR031 696

Unclassified report

Descriptors: (*Fiber metallurgy, Single crystals), (*Indium alloys, Single crystals), (*Crystal growth, Single crystals), (*Single crystals, Filaments), Alloys, Lead alloys, Tin alloys, Crystal lattice defects, X-ray diffraction analysis, Neutron activation, Radioaclivation analysis, Microanalysis, Transport properties, Diffusion, Probes (Electromagnetic)

Research was conducted in an effort to determine the mechanisms of atom transport responsible for the growth of filamentary crystals (whiskers) from the solid metal. To this end, whiskers have been grown from single phase, binary alloys of indium-tin and indium-lead. Attempts have been made to detect any difference in composition between the whisker and the base alloy from which it was grown. Such a change in composition would suggest a diffusion mechanism of atom transport, whereas the absence of a change would support a mechanism involving the cooperative, repetitive movement of dislocations. Two methods have been used to study the composition of the whiskers. These are X-ray diffraction and electron probe microanalysis. Present work is directed toward overcoming some of the difficulties in making the necessarily precise analysis of the whiskers, which are only of the order of 10 to the minus 9th power grams. (Author)

**AD-622 535 Div. 25/2**
*PITTSBURGH UNIV PA CRYSTALLOGRAPHY LAB*
**STRUCTURES RELATED TO THE WURTZITE B4 TYPE BY BLOCK INVERSION AND SHEAR,**
by G. A. Jeffrey. 1965, 3p. Contract DA ARO D31 124 61G63
AROD , 3125:5

Unclassified report

Pub. in International Conference on Electron Diffraction and Crystal Defects v2 nC-1 Melbourne 1965 (Copies available only to DDC users).

Descriptors: (*Crystal structure, Aluminum compounds), Nitrides, Carbon compounds, Complex compounds, Crystal lattice defects

The purpose of this paper is to postulate an interesting analogy in some tetrahedrally coordinated structures, where inversion and translation of blocks of tetrahedra could occur by reason of electron deficiency.

**AD-622 536 Div. 25/2**
*PITTSBURGH UNIV PA CRYSTALLOGRAPHY LAB*
**ON THE STRUCTURE OF GERMANIUM SELENIDE AND RELATED BINARY IV/VI COMPOUNDS,**
by S. N. Dutta, and G. A. Jeffrey. 4 Mar 65, 5p. Contract DA ARO D31 12461G63
AROD , 3125:6

Unclassified report

Pub. in Inorganic Chemistry v4 p1363-6 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Germanium alloys, Selenium alloys), (*Crystal structure, Germanium alloys), Tin alloys, Sulfides, Tin compounds, Germanium compounds, Intermetallic compounds

**AD-622 647 Div. 25/2 ,25/6**
*TEXAS UNIV AUSTIN DEPT OF CHEMICAL ENGINEERING*
**THE PHASE EQUILIBRIA AND CRYSTAL CHEMISTRY OF THE RARE EARTH GROUP VI SYSTEMS. II. ERBIUMTELLURIUM,**
by D. J. Haase, H. Steinfink, and E. J. Weiss. 8 Sep 64, 3p. Contract AF AFOSR62 237
AFOSR , 65-1382

Unclassified report

Pub. in Inorganic Chemistry v4 p541-3 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Rare earth elements, Crystallography), (*Erbium, Tellurium alloys), (*Tellurium alloys, Erbium), Inter metallic compounds, Solid solutions, Eutectics, Phase studies, Transition temperature, Crystal structure, X-ray diffraction analysis

The phases occurring in the erbium-tellurium system are: the solid solution series ErTe-Er2Te3, orthorhombic, Fddd, a = 12.096 A., b = 8.553 A., c = 25.659 A., the lattice constants vary throughout the solid solution series, m.p. 1525-1460C; ErTe3, orthorhombic, Cmc2, a = 4.31 A, b = 25.45 A., c = 4.31 A., peritectic at 575C. A eutectic is observed at approximately 13 atom % tellurium and 1270C. The influence of the ionic ratio on the stability of the structures is discussed. (Author)

**AD-622 662 Div. 25/2 ,25/5**
*CALIFORNIA UNIV SAN DIEGO DEPT OF PHYSICS*
**FREE ENERGY OF AN ANHARMONIC CRYSTAL.**
Technical rept.,
by L. J. Sham. 22 Mar 65, 8p. Rept. no. TR-33
Contract Nonr221611 Proj. NR017 630

Unclassified report

Pub. in The Physical Review v139 n4A pA1189-93 Aug 16 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Crystal lattices, Energy), (*Perturbation theory, Crystal lattices), Phonons, Field theory, Harmonic analysis, Entropy, Green's function, Integrals

The perturbation techniques of statistical physics have been applied to obtain two formulas for the free energy of an anharmonic crystal. One involves an integration over the coupling constant and the other involves the exact Green's function; both are exact parallels of the fermion case. The anharmonic crystal differs from the interacting fermions in the structure of the phonon interaction, the effect of which on the perturbation series is carefully considered. The stationary property of the free energy with respect to the variation of the proper self-energy is proved. Expressions for the internal energy and entropy are also derived. (Author)

**AD-622 703 Div. 25/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*OKLAHOMA STATE UNIV STILLWATER RESEARCH FOUNDATION*
**OPTICAL AND ELECTRICAL PROPERTIES OF STANNIC OXIDE CRYSTALS.**
Technical status rept. no. 28, 1 Jul-30 Sep 65,
by E. E. Kohnke. Oct 65, 8p. Contract Nonr259501

Unclassified report

Descriptors: (*Tin compounds, Oxides), Single crystals, Crystal structure, Brillouin zones, Electrical conductance, Thermal properties, Thermoelectricity, Atomic properties, Photoconductivity, Excitation, Optical properties

The report contains summaries of research on stannic oxide crystals in the following areas; reflectivity, band structure, high temperature conductivity, thermoelectric power, and photoconductivity.

**AD-622 707 Div. 25/2**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS SOLID STATE SCIENCES LAB*
**NATURAL SAPPHIRE IS NOW BEING RE-CONSTRUCTED. FLAMEFUSION BY VERNEUIL FURNACE RESULTS IN MAKING OF SYNTHETIC (NATURAL) SAPPHIRE.**
Physical sciences research papers,
by Kendrick N. Hemmenway, and Joseph A. Adamski. Sep 65, 12p. Rept. no. PSRP-134

Proj. 5621 Task 562101
AFCRL , 65-659

Unclassified report

Pub. in Lapidary Journal p258-61 May 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with American Science and Engineering, Inc., Cambridge, Mass.

Descriptors: (*Sapphires, Synthesis), Synthetic stones, Impurities, Single crystals, Crystal growth, Powders

Synthesis of doped sapphire single crystals has been accomplished by two methods: First, by using stock solutions in preparation of feed material for flame-fusion growth; and, secondly, by using natural specimens of Montana blue sapphire as a source of powder material for (reconstructed) flame-fusion growth. Comparison of the two methods and preliminary results are discussed. (Author)

**AD-622 742 Div. 25/2**
*CENTRAL INST FOR INDUSTRIAL RESEARCH OSLO (NORWAY)*
**ON THE DEFECT STRUCTURE OF RUTILE,**
by Tor Hurlen. 18 Nov 58, 14p. Contract AF61 514 892

Unclassified report

Pub. in Acta Chemica Scandinavica v13 p365-76 1959 (Copies available only to DDC users).

Descriptors: (*Rutile, Crystal lattice defects), Titanium compounds, Oxides, Impurities

From the point of view of its importance to the understanding of the oxidation behaviour of titanium and titanium alloys, a theoretical reinvestigation is made of the defect structure of rutile with special emphasis on what is to be expected from the ideal rutile structure itself. A discussion is moreover given of previous experimental results on the subject, and it is concluded that most of the available data are possibly best explained by assuming the defect structure to be a combination of a non-stoichiometric and a stoichiometric one, both involving titanium interstitial ions. (Author)

**AD-622 796 Div. 25/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*WESTINGHOUSE ELECTRIC CORP PITTSBURGH PA*
**GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS.**
Quarterly technical rept. no. 9.
1965, 8p. Contract AF49 638 1245

Unclassified report

See also AD-614 435.

Descriptors: (*Rare earth compounds, Single crystals), (*Single crystals, Rare earth compounds), (*Crystal growth, Rare earth compounds), Dysprosium compounds, Resistance (Electrical), Lanthanum, Selenium, Neodymium, Samarium, Impurities, Cryogenics, Cerium, Praseodymium, Solid solutions, Chromium alloys, Tellurium alloys, Antimony alloys, Europium compounds, Sulfides, Silicon, Chromium compounds, Bromides, Palladium alloys, Aluminum alloys, Gadolinium alloys, Nuclear spins, Magnetism, Manganese compounds, Zinc compounds, Carbon compounds, Electrical properties

The electrical resistivities of the intra-rare-earth alloys of dysprosium have been determined at 4.2, 77, and 296K for a continued study of the impurity scattering of the conduction electrons. The resistivity data reveal that substitution of La, Ce, Pr, Nd, and Sm in Dy leads to considerable increases of the residual resistivity of Dy at low temperatures, but the increases disappear at 296K. The impurity-induced resistivities are predominantly due to the exchange scattering of the electrons via the Ruderman-Kittel type exchange interaction between the 4f and conduction electrons. The exchange scattering is shown to depend only on the difference between the atomic spins of the solvent and solute ions, with the spin-orbit coupling playing an insignificant role. Neutron diffraction studies of the CrTe-CrSb solid solutions have revealed the formation of a canted spin structure in the pseudo-binary system with cosine of the cant angle varying as a linear function of the composition. Work was continued on the electrical properties of EuS single crystals, Si-doped CrBr3, and dilute alloys of Pd and Al containing Gd. A magnetic study was initiated of Mn3ZnC.

**AD-622 845 Div. 25/2 ,25/7**
*UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF PHYSICS*
**POLARIZATION EFFECTS IN TWO-PHONON RAMAN SCATTERING IN CUBIC CRYSTALS,**
by Leonard Kleinman. 29 Jan 65, 8p. Contract AF AFOSR496 65 ,NsG178 61
AFOSR , 65-1224

Unclassified report

Pub. in Solid State Communications v3 p47-53 1965 (Copies available only to DDC users).

Descriptors: (*Phonons, Scattering), (*Raman spectroscopy, Crystal lattices), (*Polarization, Raman spectroscopy), Molecular rotation, Symmetry (Crystallography), Tensor analysis

It is shown how to calculate which irreducible representations are present in any two-phonon state even when the individual phonons are degenerate; and how, using polarization effects, to determine experimentally which Raman active irreducible representations are present in the two-phonon state responsible for any Van Hove singularity in the two-phonon Raman dispersion curve. (Author)

**AD-622 888 Div. 25/2**
*MUSEO NACIONAL DE CIENCIAS NATURALES MADRID (SPAIN) DEPARTAMENTO DE CRISTALOGRAFIA*
**STUDIES OF THERMAL MOTION IN CRYSTALS.**
Technical note,
by J. L. Amoros, J. Vargas, M. L. Canut, and E. Riano. 1958, 185p. Contract AF61 514 1146

Unclassified report

Also includes Determination of the Laue Symmetry of a Crystal from one Colindrical Laue Photograph. Interpretation of the extended continuous regions of X-ray thermal diffuse scattering of Molecular Crystals. Thermal expansion of substances of ClNa - Type. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale. Portion of text in Spanish.

Descriptors: (*Crystals, Thermal properties), Reviews, Molecular properties, Crystal lattices, Amines, Diffusion, Scattering, Lead compounds, Sulfides, Magnesium compounds, Oxides, Spain

**AD-622 893 Div. 25/2**
*UPPSALA UNIV (SWEDEN) DEPT OF PHYSICS*
**STUDY ON THE RELAXATION OF DISLOCATIONS IN F. C. C. METALS,**
Inaugural Dissertation,
by Mervana Mongy. 1965, 8p. Contract AF EOAR63 53 Proj. 9763 Task 9763 02
AFOSR , 65-1176

Unclassified report

Pub. in Acta Univ. Upsaliensis v54 p3-6 1965 (Copies available only to DDC users).

Descriptors: (*Metals, Crystal lattice defects), (*Crystal lattice defects, Relaxation time), Single crystals, Aluminum, Copper, Silver, Gold, Internal friction, Anisotropy, Heat of activation

The effect of orientation of single crystals on the shape and position of the internal friction peak was investigated. Single crystals of four face centered cubic metals, aluminum, copper, silver, and gold, were measured in the /100/, /110/, and /111/ directions. Minimum values were obtained in the /111/ direction for aluminum, copper, and gold, and in the /100/ direction for silver. A high degree of anisotropy in the values of the activation energy and the relaxation frequency was observed in all the metals. The values of the activation energy and relaxation frequency in polycrystalline samples represent a mean value of those measured in the three principal directions of the single crystals. (Author)

**AD-622 328 See Fld. 8/7**

**AD-622 338 See Fld. 20/6**

**AD-622 380 See Fld. 20/3**

**AD-622 558 See Fld. 20/6**

**AD-622 561 See Fld. 9/3**

**AD-622 576 See Fld. 20/6**

**AD-622 579 See Fld. 20/6**

**AD-622 635 See Fld. 5/1**

**AD-622 648 See Fld. 20/12**

**AD-622 749 See Fld. 11/6**

**AD-622 774 See Fld. 5/1**

**AD-622 798 See Fld. 20/13**

**AD-622 801 See Fld. 20/13**

**AD-622 851 See Fld. 20/13**

**AD-623 030 See Fld. 20/12**

## 20/3. ELECTRICITY AND MAGNETISM

**AD-622 380 Div. 25/3 ,25/6 ,17/7 ,25/2**
**CFSTI Prices: HC $4.00 MF $0.75**
*WESTINGHOUSE RESEARCH LABS PITTSBURGH PA*
**BASIC STUDIES ON THERMOELECTRIC MATERIALS.**
Quarterly rept. no. 12, 1 Apr-27 Sep 64.
Oct 64, 106p. Contract NObs90444 Proj. SR007 12 01 Task 801

Unclassified report

See also AD-622 381.

Descriptors: (*Thermoelectricity, Materials), (*Semiconductors, Thermoelectricity), (*Selenium, Thermoelectricity), Platinum alloys, Antimony alloys, Bismuth alloys, Tellurium alloys, Crystal structure, Pressure, Electrical properties, Single crystals, Transport properties, Atomic energy levels, Electron transitions

Studies of the band structures and transport properties were made of bismuth telluride, platinum antimonide, and selenium.

**AD-622 391 Div. 25/3 ,4/4**
**CFSTI Prices: HC $4.00 MF $0.75**
*RESEARCH AND ADVANCED DEVELOPMENT DIV AVCO CORP WILMINGTON MASS*
**RESEARCH ON RADIATION FROM ARC HEATED PLASMA.**
Final technical rept. for 1 Mar 64-1 Apr 65,
by J. C. Morris, R. U. Krey, and R. W. Liebermann. 9 Jul 65, 113p. Contract AF33 616 8390 Proj. 7063 Task 706303
ARL , 65-164

Unclassified report

Descriptors: (*Plasma medium, Continuous spectrum), (*Oxygen, Continuous spectrum), (*Nitrogen, Continuous spectrum), Electric arcs, Transport properties, Atmosphere entry, Reentry vehicles

Spectral continuum intensity measurements from 2500 A to 20,000 A and total radiation measurements were made for oxygen and nitrogen plasmas for a temperature range of 9000 K to 13,000 K using a mechanically constricted dc arc as a radiation source. The spectral data were treated analytically to separate the radiation from electron neutral atom and electron positive ion collisions. The electron neutral data were further reduced to radiative cross sections which are in turn compared with the results of other experimental investigations and with theoretical predictions. The spectral continuum data were integrated to find the total continuum for lambda > 2000 A. These data were subtracted from the total radiation measurements lambda > 2000 A to obtain the contribution from line radiation. These data are compared with analytical predictions for atomic line radiation and found to be in good agreement. Radiation tables were generated, based upon these experimental data, for the total continuum plus atomic line radiation for wavelengths greater than 2000 A and for the total continuum plus total atomic line radiation for all wavelengths for temperatures ranging from 9000 K to 18,000 K and for pressures from 0.1 to 10.0 atmospheres. These data are also presented in terms of flight velocity. These data are compared with reported values gathered from shock tube and ballistic range work. (Author)

**AD-622 407 Div. 25/3 ,8/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*RHODE ISLAND UNIV KINGSTON*
**UNIFORM EVALUATION OF RADIATION FIELDS.**
Scientific rept.,
by Julius Kane, and John P. Cretella. Jun 65, 36p. Rept. no. SR-6
Contract AF19 604 7983 Proj. 5635 Task 563502
AFCRL , 65-560

Unclassified report

Descriptors: (*Field theory, Diffraction), (*Integral transforms, Field theory), Integrals, Special functions (Mathematical), Trigonometry, Fourier analysis, Electromagnetic waves, Propagation

Solutions to many problems involving electromagnetic wave propagation are often given as contour integrals in the wave number plane which unfortunately cannot be readily evaluated. By employing the method of steepest descents, asymptotic expansions can be found to determine the far fields, but these furnish little information on the transition region from the source to the Fraunhofer region. In this work, a procedure is introduced which facilitates the evaluation of Fourier-type integrals in the Fresnel zone. The present method decomposes the integral representation into a standard form: a linear combination of two Hankel functions of the first kind, trigonometric functions. With this result, an exact representation which is uniformly valid from the near zone to the far field is obtained. The useful domain also includes such regions as the critical angles in real space, corresponding to the shadow boundaries associated with the pole contributions.

**AD-622 408 Div. 25/3 ,8/1**
**CFSTI Prices: HC $4.00 MF $0.75**
*CASE INST OF TECH CLEVELAND OHIO*
**ANALYSIS OF COMPRESSIBLE PLASMA CONTAINED IN A WAVEGUIDE.**
Scientific rept.,
by M. I. Sancer. Nov 65, 119p. Rept. no. SR-11
Contract AF19 628 1699 Proj. 5635 Task 563501
AFCRL , 65-644

Unclassified report

Descriptors: (*Plasma medium, Waveguides), (*Waveguides, Plasma medium), Magnetohydrodynamics, Compressible flow, Electrons, Matrix algebra, Operators (Mathematics), Boundary value problems, Mathematical models

The analysis of a compressible plasma which is contained in a waveguide of general cross-section is presented. The plasma is described by the linearized multifluid equations and the source terms are allowed to be quite general. Anistropic effects which are caused by the presence of an externally applied constant axial magnetic field are included. Two distinct approaches are used in the analysis of these equations. The first is classical and the second considers the system of equations as a linear operator and presents a formal spectral representation of this operator. For both approaches the electron fluid model is analyzed in considerable detail and then the analysis is generalized to be applicable to the multifluid model. A general set of boundary conditions is presented and is shown to guarantee that a solution to linearized multifluid equations which satisfy these boundary conditions is unique. The boundary conditions which are used because of physical considerations are shown to belong to this set of mathematically meaningful boundary conditions. (Author)

**AD-622 426 Div. 25/3 ,25/6**
**CFSTI Prices: HC $3.00 MF $0.75**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**EXOELECTRON EMISSION FROM THIN FILMS.**
Master's thesis,
by Duane M. Mathias. Aug 65, 84p. Rept. no. GE/EE/65-16

Unclassified report

Descriptors: (*Films, Emissivity), (*Dielectric films, Emissivity), (*Thermionic emission, Films), Aluminum compounds, Oxides, Vapor plating, Excitation, Electrodeposition, Luminescence

Electron trapping in thin aluminum oxide films was investigated through the measurement of electron emission obtained while heating the excited sample through the temperature range of 0 - 420C. Eight aluminum oxide films of different thicknesses were fabricated; six by vacuum evaporation and two by anodization. Results showed that films prepared by vacuum evaporation technique had traps distributed in energy with negligible retrapping. The films prepared by anodizing had two single valued traps of 1.29 ev for the deep traps and .69 ev for the shallow traps. Data indicated that as the film thickness decreases, the number of traps increases. (Author)

**AD-622 539 Div. 25/3 ,9/1**
*MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING*
**VALIDITY OF INTEGRAL METHODS IN MHD BOUNDARYLAYER ANALYSES,**
by John B. Heywood, and W. Craig Moffatt. 7 May 65, 3p. Contract Nonr362302

Unclassified report

Pub. in AIAA Journal v3 n8 p1565-7 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Laminar boundary layer, Magnetohydrodynamics), (*Magnetohydrodynamics, Laminar boundary layer), (*Numerical methods and procedures, Integrals), Heat transfer, Momentum

**AD-622 540 Div. 25/3**
*MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING*
**MAGNETOHYDRODYNAMIC EFFECT ON OPENCHANNEL FLOW.**
Revised ed.,
by Walter J. Bornhorst. 8 Mar 65, 2p. Contract Nonr362302

Unclassified report

Pub. in AIAA Journal p117-8 Jun 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 5 Nov 64.

Descriptors: (*Magnetohydrodynamics, Fluid flow), Electrical conductance, Electric fields, Mercury, Gravity, Electric currents

The behavior of a conducting fluid, flowing in the absence of an electric field in an open channel under the influence of gravity and an applied vertical magnetic field, was investigated theoretically and experimentally. The mercury enters the channel with an x-directed uniform velocity. The effect of the magnetic field is to induce an electric field and a current (j) in the negative z direction. The current returns outside the channel through an artificial perfect conductor. Since the current is transverse to the magnetic field (B), a j X B body force is induced in the negative x direction. Theoretical analysis was made of the linearized momentum equation for the steady flow of an inviscid and incompressible fluid. The results are presented graphically for values of N, the quantity expressing the ratio between the product of the fluid conductivity, B squared, and the x-directed uniform velocity and the product of mass density and the acceleration of gravity. Experimental results were obtained photographically. Good agreement was obtained for experimentally determined coordinates of the free surface and theoretical curves for corresponding values of N, except for large values.

**AD-622 547 Div. 25/3 ,9/1**
*MASSACHUSETTS INST OF TECH CAMBRIDGE FLUID MECHANICS LAB*
**SOME REMARKS ON PLASMA OSCILLATIONS AND THE KINETIC THEORY OF PLASMAS,**
by C. H. Su. 12 Nov 64, 4p. Contract Nonr184193

Unclassified report

Pub. in The Physics of Fluids v8 n6 p1115-8 Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasma oscillations, Kinetic theory), (*Kinetic theory, Plasma oscillations), Statistical functions, Particle trajectories, Integral transforms, Linear systems, Plasma physics, Fluid mechanics, Magnetohydrodynamics

In the linearized Vlasov's equation, the solution to the distribution function can be split into two parts. The one which takes the form of the free-particle propagation makes the neglected term in the linearized theory grow in t. A method of coping with such difficulty is suggested. The method is applied to some very simple cases where in the long time limit one needs a modification of the first-order distribution function, but not the first-order electric field. In general, it is believed that

both these quantities have to be modified. The nature of higher-order corrections to the plasma kinetic equation is discussed. It is shown by the order of magnitude argument that the kinetic equation of a plasma cannot be extended beyond the first-order approximation with the adiabatic assumption of Bogoliubov. (Author)

**AD-622 568 Div. 25/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*INNSBRUCK UNIV (AUSTRIA) INST FOR THEORETICAL PHYSICS*
**TWO-DIMENSIONAL STEADY AND ONE-DIMENSIONAL UNSTEADY MGD FLOWS OF SMALL MAGNETIC REYNOLDS NUMBER.**
Scientific rept.,
by K. Lackner. 3 Feb 65, 9p. Rept. no. SR-25
Contract AF61 052 675
AFOSR , 65-1320

Unclassified report

Descriptors: (*Magnetohydrodynamics, Fluid flow), Two-dimensional flow, One-dimensional flow, Magnetic fields, Reynolds number, Mathematical analysis, Partial differential equations, Austria

The applicability of the method of characteristics to the investigation of two-dimensional steady and one-dimensional unsteady MGD flows of small magnetic Reynolds number is studied. Preliminary results are shown to be promising. (Author)

**AD-622 569 Div. 25/3**
**CFSTI Prices: HC $5.00 MF $1.25**
*ROCHESTER UNIV N Y DEPT OF MECHANICAL AND AEROSPACE SCIENCES*
**PLASMA DENSITY AHEAD OF PRESSURE DRIVEN SHOCK WAVES.**
Technical note.
by Lawrence Bruce Holmes. May 65, 200p.
Rept. no. TN-1
Contract AF AFOSR478 65 Proj. 9783 Task 978302
AFOSR , 65-0974

Unclassified report

Doctoral thesis.

Descriptors: (*Plasma medium, Density), (*Shock tubes, Plasma medium), Shock waves, Probes (Electromagnetic), Photochemistry, Ionization, Pressure, Electrostatics, Magnetic fields

A review of the literature on electrical precursors associated with strong shock waves is presented. Negative well-type electrostatic precursor signals are obtained from the potential probe experiments. Potential probe experiments in conjunction with a solenoidal magnetic field show that the electrostatic precursor signal is due in part to radial diffusion of electrons to the wall of the shock tube. A theory is presented for the diffusion of the electrons and ions to the grid of the probe and for the motion of the charged particles inside the probe. This theory relates the collected currents to the plasma density in the shock tube. The evidence of the existence of a neutral plasma and the high velocity of propagation of the precursor strongly suggests that the gas ahead of the shock wave is photoionized. It was established that multiple step photoionization produces the plasma.

**AD-622 614 Div. 25/3**
*MASSACHUSETTS INST OF TECH CAMBRIDGE*
**HIGH MAGNETIC FIELDS,**
by Henry Kolm, Benjamin Lax, Francis Bitter, and Robert Mills. 1962, 761p. Contract AF AFOSR61 31

Unclassified report

Proceedings of the International Conference on High Magnetic Fields held at Massachusetts Inst. of Tech., Cambridge, 1-4 Nov 1961. Available from M. I. T. Press and John Wiley and Sons, New York and London.

Descriptors: (*Magnetic fields, Symposia), Reports, Magnets, Solenoids, Solid state physics, Lowtemperature research, Plasma physics, Superconductors, Supercooling, Magnetic properties, Power supplies, Cryogenics, Electromagnetic shielding

Some 88 of the papers prepared for the first International Conference on High Magnetic Fields are published in this volume. These reports cover the most significant present work on the generation and use of very high or very special magnetic fields, including new solenoid designs for pulsed or continuous operation, developments in cryogenics, new generators and power supplies, new cooling systems for continuous-field coils, analyses and fabrication experiments on superconductive compounds and rare-earth alloys, continuing attacks on plasma-containment problems arising in controlled thermonuclear fusion research, and studies magneticshielding-system parameters for the protection of space travellers against high-energy radiation. The four parts of this volume cover: designs of high-field solenoids and supporting systems, high-field research programs now underway at laboratories around the world, application of high fields in solid-state and low-temperature physics, and use of high fields in plasma physics. References at the end of each paper constitute in sum the most complete bibliography of the field yet compiled.

**AD-622 641 Div. 25/3**
*NATIONAL MAGNET LAB MASS INST OF TECH CAMBRIDGE*
**PE-14. PLASMONS IN MAGNETIC FIELD,**
by N. J. Horing. 1965, 11p. Contract AF19 604 7344
AFOSR , 65-1170

Unclassified report

Pub. in Effects de Plasmas dans les Solides, Paris at the Congres International de Physique des Semiconducteurs (7th) p107-16.

Descriptors: (*Excitation, Electrons), (*Magnetic fields, Excitation), Plasma oscillations, Damping, Green's funtion, Dielectric properties

A summary is presented of the results of calculations on plasmons in a magnetic field. The calculations are based on a Green's function formulation of the random phase approximation for the inverse dielectric function of an electron gas in a magnetic field. The Green's function can be obtained in closed form, and the resulting inverse dielectric function has been used to write the plasmon dispersion relation and damping constant in relatively tractable forms which are not encumbered by unwieldy summations over Landau eigenstates.

**AD-622 652 Div. 25/3 ,15/1**
*INNSBRUCK UNIV (AUSTRIA) INST FOR THEORETICAL PHYSICS*
**LEGENDRE TRANSFORMATION AND CHARACTERISTICS OF THE MAGNETOGASDYNAMIC POTENTIAL EQUATION,**
by F. Cap. 15 Jul 64, 12p. Contract AF61 052 675 Proj. 9752 Task 975201
AFOSR , 65-1431

Unclassified report

Pub. in Plasma Physics (Journal of Nuclear Energy Part C) v7 p69-77 1965 (Copies available only to DDC users).

Descriptors: (*Magnetohydrodynamics, Potential theory), (*Plasma physics, Potential theory), Dynamics, Two-dimensional flow, Transformations (Mathematics), Differential equations

For the potential equation of the 2-dimensional stationary potential flow of a plasma of infinite conductivity, a method of characteristics is derived which is set up in analogy to the Prandtl-Busemann method of gas dynamics. The differential form of the potential equation is subjected to a Legendre transformation in order to obtain a linear differential equation whose characteristics are determined once for all. Polar co-ordinates are introduced and solutions are obtained graphically which are in good agreement with the numerical curves. A graphical method for the solution of magnetogasdynamic 2-dimensional stational stationary flow problems can thus be based on the characteristic curves and the velocity curve. (Author)

**AD-622 673 Div. 25/3 ,27/3**
*GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF SPACE SCIENCE LAB*
**ENERGY PARTITION IN THE CURRENT LAYERS IN PLASMA.**
Revised ed.,
by Jan Rosciszewski. 5 Oct 64, 3p. Contract AF49 638 1357
AFOSR , 65-1438

Unclassified report

Pub. in AIAA Journal v3 n2 p373-5 Feb 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 25 Aug 64.

Descriptors: (*Plasma medium, Electric currents), (*Gas discharges, Plasma medium), Energy, Laminar flow, Gas flow, Plasma jets, Electric propulsion

Many plasma propulsion systems are based on the principle that the moving current layer sweeps out the gas. This principle seems to lead to devices of limited efficiency as the internal energy becomes a significant fraction of the total energy. The stationary rarefaction ('deflagration') type of discharge layer provides a decrease in internal energy across the layer, and therefore should lead to much more efficient devices. It seems that the deflagration type of current layer occurs in the Giannini Corporation device. These two types of discharge layers are discussed from the gasdynamic point of view rather than propulsion application. The quantitative analysis of the discharge layer requires solution of the structure of such a layer, a difficult problem because of the multifluid nature of the discharge layer. However, quantitative information can be obtained by discussing only conservation relations across a layer.

**AD-622 684 Div. 25/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING*
**STUDY OF COLLISION PROCESSES IN GASEOUS PLASMAS.**
Status rept. no. 7, 1 Jul-1 Oct 65,
by H. J. Oskam. 1 Oct 65, 5p. Contract Nonr71037 Proj. NR012 206

Unclassified report

Descriptors: (*Plasma physics, Gases), Recombination reactions, Ions, Motion, Helium, Neon

Studies related to collision processes in gaseous plasmas are summarized for the period July 1, 1965 to October 1, 1965. The main results obtained are related to recombination mechanisms in helium and neon, and to the mobility of positive ions in helium.

**AD-622 701 Div. 25/3 ,30/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*AVCO EVERETT RESEARCH LAB EVERETT MASS*
**BASIC STUDIES IN MAGNETOHYDRODYNAMICS.**
Final rept.,
by Richard M. Patrick. Nov 64, 14p. Contract AF49 638 1129 Proj. 9751 Task 975101
AFOSR , 65-1207

Unclassified report

Descriptors: (*Magnetohydrodynamics, Test facilities), (*Shock tubes, Plasma medium), (*Plasma physics, Shock tubes), Electrons, Scattering, Shock waves

In this investigation, the magnetic annular shock tube (MAST) is developed and used to study plasma phenomena important for collision free plasmas. Studies are carried out to bring the MAST to a state of development where it will become an established research tool. It is found that for a given shock velocity the shock tube must have a minimum length and that the plasma must be contained away from the walls of the tube, this being done by the use of magnetic fields. The annulus ratio and ablation are also important considerations in successful MAST operation. The plasma produced by the shock wave is collisionless in that the mean free path for ordinary collisions is large compared to the shock thickness. However, the importance of collisions in the shock front itself is not clear. (Author)

**AD-622 715 Div. 25/3 ,6/5 ,12/1 ,2/4**
**CFSTI Prices: HC $5.00 MF $1.00**
*EDGERTON GERMESHAUSEN AND GRIER INC BOSTON MASS*
**HIGH ENERGY LASER SYSTEM FOR GEODETIC RESEARCH.**
Final rept. for 1 Apr 63-2 Jul 65,
by Sumner Ackerman. 30 Sep 65, 153p. Rept. no. B-3011
Contract AF19 628 2950 Proj. 7600 Task 760006
AFCRL , 65-671

Unclassified report

Descriptors: (*Lasers, Optical tracking), (*Optical tracking, Satellites (Artificial)), (*Satellites (Artificial), Geodesics), Illumination, Reflectors, Photoelectric effect, Orbital trajectories, Range finding, Position finding

The design, operation, and performance of a high-energy laser system developed specifically for geodetic satellite research are described. The ground-based laser illuminator uses a liquid-N2-cooled 16-mm (diameter) by 184-mm (length) ruby crystal. It has a nominal output of 250 joules at 6935 A with 17,000 joules of pump supply and a pulse duration of 2.5 milliseconds. Discussion of the system's performance is based on 15 months of operating experience which has shown that high-energy lasers are practical for geodetic research applications requiring long periods of reliable operation under outdoor field conditions. The feasibility of Project LARGOS (Laser-Activated Reflecting Geodetic Optical Satellite), sponsored by the Terrestrial Sciences Laboratory of AFCRL, was verified experimentally using this equipment when clearly detectable star images of the Explorer 22 Satellite were obtained on 21 January, 29 January, and 3 February 1965 at ranges up to 925 statute miles. Range measurements by photoelectric detection were obtained simultaneously. A study was made of cube-corner reflectors suitable for satellite geodesy showing that, ideally, these should be almost diffraction limited with an aperture of the correct diameter to obtain the desired beamwidth.

**AD-622 740 Div. 25/3**
*GUGGENHEIM JET PROPULSION CENTER CALIF INST OF TECH PASADENA*
**NONEQUILIBRIUM ELECTRICAL CONDUCTIVITY MEASUREMENTS IN ARGON AND HELIUM SEEDED PLASMAS,**
by Edward E. Zukoski, and Terrill A. Cool. 24 Aug 64, 4p. Rept. no. 165
Contract AF AFOSR160 63 Proj. 9751 Task 975101
AFOSR , 65-1419

Unclassified report

Pub. in AIAA Journal v3 n2 p370-1 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Plasma media, Electrical conductance), Argon, Helium, Potassium, Vapors, Relaxation time, Electric fields, Gas ionization

Experimental and calculated conductivity measurements are presented as a function of current density for the argon-potassium system with neutral gas temperatures of 1500 = 30K and 2000 = 100K at 1 atm pressure. Measurements were also made for helium-potassium conductivity and relaxation times at 2000 = 100K. Conductivity values were calculated as in a similar but less extended study by Zukoski, Cool, and Gibson (AIAA Jour., v. 2: 1410-1417, 1964, AD-602 683). Good agreement exists between experimental and calculated values of conductivity for both systems. (Author)

**AD-622 795 Div. 25/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*NORTHWESTERN UNIV EVANSTON ILL GAS DYNAMICS LAB*
**LAMINAR AND TURBULENT MAGNETOHYDRODYNAMIC FREE JET.**
Interim rept. for 1 Dec 63-1 Dec 64,
by David C. Smith, and Ali Bulent Cambel. Aug 65, 22p. Contract AF33 615 1160 Proj. 7063 Task 706303
ARL , 65-172

Unclassified report

Descriptors: (*Magnetohydrodynamics, Perturbation theory), (*Plasma jets, Magnetohydrodynamics), Laminar flow, Turbulence, Magnetic fields, Mathematical analysis

A perturbation solution is obtained for a free jet of an electrically conducting fluid in the presence of a transverse magnetic field. The solution is obtained in closed form to first order in the perturbation parameter, which is the ratio of the magnetic force to the inertia force of the jet. Both laminar and turbulent jets are considered. (Author)

**AD-622 811 Div. 25/3 ,30/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*MCDONNELL AIRCRAFT CORP ST LOUIS MO RESEARCH DIV*
**DETERMINATION OF ELECTRON DENSITIES USING A RADIAL TRANSMISSION LINE.**
Scientific rept.,
by J. H. Mullen, and L. N. Medgyesi-Mitschang. May 65, 36p. Rept. no. SR-1 ,A889
Contract AF19 628 2764 Proj. 4642 Task 464202
AFCRL , 65-553

Unclassified report

Descriptors: (*Probes (Electromagnetic), Plasma physics), (*Plasma physics, Probes (Electromagnetic)), (*Electron density, Plasma physics), (*Measuring devices (Electrical + Electronics), Plasma physics), Electromagnetic waves, Phase shift, Attenuation, Plasma medium, Transmission lines

This report presents a new method for measuring the electron density and collision frequency of plasmas. This diagnostic technique which is applicable to low as well as high density plasmas, minimizes the usual field problems associated with microwave plasma diagnostic schemes. The effect of plasma non-uniformity on this technique has been calculated. Spectrographic measurements and thermodynamic partition function calculations were found to be consistent with the plasma parameters measured with the present technique. (Author)

**AD-622 905 Div. 25/3 ,25/6**
*WESLEYAN UNIV MIDDLETOWN CONN DEPT OF PHYSICS*
**RANGE OF FERROMAGNETIC EXCHANGE INTERACTION IN NONMAGNETIC FILMS ON IRON SUBSTRATES,**
by W. L. Trousdale, and R. A. Lindgren. 1965, 3p. Contract AF AFOSR636 64
AFOSR , 65-1370

Unclassified report

Pub. in Journal of Applied Physics v36 n3 pt2 968-70 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Ferromagnetism, Metal films), (*Hyperfine structure, Field theory), Mossbauer effect, Transport properties, Vapor plating, Electrons, Spin, Polarization

An experiment was performed to measure the penetration of conduction electron spin polarization into nonmagnetic metallic films deposited on an iron substrate. The technique was to evaporate the metal in question on the iron and then to probe the effective exchange field, produced by the electron spin polarization, as a function of the distance from the substrate by evaporating an intermediate partial layer of 57Co. The hyperfine field of the 57Fe was measured by the Mossbauer method and the exchange was calculated from the hyperfine field under the assumption that the hyperfine field is related to the exchange field through the Brillouin function of the local spin. Measurements were carried out at 300, 78, 4.20, and 1.22K. Samples using palladium on an iron substrate were investigated with the 57Fe placed from 20 to 120 lattice spacings away from the substrate with the following results: (1) The size of the exchange field varies from 0 to approximately 150K in the thinnest sample and from 0 to 25K in the thickest. (2) For samples of given thickness, an empirical probability distribution function for the exchange field was found which gave a good fit to the hyperfine spectra at all temperatures. (3) The probability function is maximum at zero exchange field, decays initially quite rapidly, and then tails off slowly. A few measurements were made with copper and silver as the intermediate metal. The indication is that the effective exchange field in copper is greater than in silver but considerably less than in palladium. (Author)

**AD-622 910 Div. 25/3 ,8/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*RADIOLOCATION RESEARCH LAB UNIV OF ILLINOIS URBANA*
**THE PROPAGATION OF CURRENT ALONG INFINITE SINUSOIDAL TAPES.**
Technical rept.,
by John William Greiser. Sep 65, 87p. Rept. no. RRL-286 ,TR-13
Contract NObsr89229 ,NObsr183402 Task 30

Unclassified report

Descriptors: (*Electric currents, Propagation), (*Antennas, Electric currents), (*Antenna radiation patterns, Electric currents), Tapes, Delay lines, Log periodic antennas, Helical antennas, Travelingwave tubes, Fourier analysis

The propagation and radiation characteristics of electric current on infinite sinusoidal conducting tapes are studied. The determinantal equation for the propagation constant is derived for both planar and ribbon tapes. With the aid of a digital computer the determinantal equation for the planar tape is solved and the results are plotted in the form of Brillouin or dispersion diagrams. The approach used to investigate the propagation characteristics of sinusoidal tapes is based on Floquet's theorem and a Fourier expansion of the space variation of the electric current on the tape structure. A filamentary electric current is assumed to be flowing along the center line of an infinite, perfectly conducting, sinusoidal tape. The current is expressed as the infinite summation of space harmonics of unknown amplitude. From the expansion for the current the vector potential is derived and thence the expressions for the electric field everywhere. An equation involving the fundamental propagation constant alone is solved approximately with numerical procedures on a digital computer, and the unknown current space harmonic amplitudes are determined.

**AD-622 927 Div. 25/3 ,25/6**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**CHEMICAL INHOMOGENEITIES AND SQUARE B-H LOOPS,**
by John B. Goodenough. 23 Dec 64, 6p. Rept. no. JA-2516
Contract AF19 628 5167
ESD , TDR-65-453

Unclassified report

Pub. in Journal of Applied Physics v36 n8 p2342-6 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetic materials, Impurities), (*Hysteresis, Geometric forms), Grain boundaries, Crystal lattice defects, Spinel, Manganese, Copper, Magnesium, Magnetic cores

It is shown that in ferrites exhibiting spontaneously square B-H loops, reverse-domain nucleation may occur either at a grain boundary or at a chemical inhomogeneity having a volume roughly 0.1 of a grain volume, a magnetization about 2% different from that of the parent matrix, and no static crystallographic discontinuity at the inhomogeneity-matrix interface. It is pointed out that such chemical inhomogeneities may occur in spinels having Jahn-Teller ions in concentrations that are too small to produce a cooperative, static distortion of the entire crystal from cubic symmetry. It is postulated that the formation of such inhomogeneities is responsible for the sharp knee in spontaneously square B-H loops found in many ferrites containing Mn (3+) and Cu (2+) ions, in particular the magnesium-manganese composition used in memory-core ferrites. (Author)

**AD-622 967 Div. 25/3 ,25/4**
*ILLINOIS UNIV URBANA DEPT OF ELECTRICAL ENGINEERING*
**HIGH-FREQUENCY LASER INTERFEROMETRY IN PLASMA DIAGNOSTICS,**
by J. B. Gerardo, J. T. Verdeyen, and M. A. Gusinow. 1 Dec 64, 6p. Contract DA ARO D31 124G582
AROD , 4832:1

Unclassified report

Pub. in Journal of Applied Physics v36 n7 p2146-51 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Interferometers), (*Interferometers, Lasers), (*Plasma physics, Interferometers), High frequency, Probes (Electromagnetic), Optics

The time response of the laser interferometer is studied, and the parameters that are instrumental in limiting its time response are discussed. It is shown that by judicious selection of parameters the laser interferometer is capable of detecting resonances in excess of 50 per microsecond, which is close to the theoretical limit of the resonant structure used. The applicability of the interferometer to measurement of very rapidly changing plasma electron densities is demonstrated. (Author)

**AD-622 969 Div. 25/3 ,9/1**
*CASE INST OF TECH CLEVELAND OHIO*
**MAGNETOGASDYNAMIC RAYLEIGH PROBLEM WITH INFINITE CONDUCTIVITY,**
by Pau-Chang Lu. 1963, 23p.

Unclassified report

Pub. in Developments in Mechanics, Proceedings of the Midwestern Mechanics Conference (8th) p85-106 Apr 1-3 1963 (Copies available only to DDC users).

Descriptors: (*Magnetohydrodynamics, Electrical conductance), (*Series, Magnetohydrodynamics), Compressible flow, Gases, Boundary layer, Flat plate models, Thermal conductivity, Velocity, Temperature, Viscosity, Magnetic fields

The velocity, temperature, and magnetic-field distributions in a compressible and viscous fluid, both thermally and electrically conducting, induced by the impulsive motion of an infinite flat plate in its own plane are obtained by applying the inner-outer expansion technique of Kaplun, Lagerstrom and Cole (P. A. Lagerstrom and J. D. Cole, J. Rat. Mech. Anal. 4, 817-882 (1955); S. Kaplun and P. A. Lagerstrom, J. Math. Mech. 6, 585-593 (1957).) The problem is first discussed in general terms. Details are then taken up for the limiting case of infinite electric conductivity with a discussion of the connection between this and the case of large but finite conductivity via a magnetic boundary layer. The applicability is shown of the expansion technique to problems of this kind and the interaction is demonstrated between the inner and the outer flow regions. No numerical calculations are undertaken. (Author)

**AD-623 009 Div. 25/3 ,9/1 ,25/6**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**JOURNAL OF APPLIED MECHANICS AND TECHNICAL PHYSICS (COLLECTION OF ARTICLES).**
14 Sep 65, 361p. Rept. no. FTD-MT-64-285
TT , 65-64300

Unclassified report

Edited machine trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) n2 176p 1964. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Physics, Periodicals), (*Mechanics, Periodicals), Particle beams, Shock waves, Magnetohydrodynamics, Conductivity, Electric currents, Plasma physics, Incompressible flow, Silt, Stresses, Stability, Creep, Aluminum alloys, High pressure research, Subsonic flow, Space flight, Solar sails, Kinetic theory, Operators (Mathematics), Supersonic flow, Nonequilibrium flow, Turbulence, Detonations, Explosives, Flame propagation, Liquid metals, Resistance (Electrical), USSR

**AD-623 054 Div. 25/3**
*RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE*
**AN MHD CHANNEL FLOW WITH TEMPERATURE DEPENDENT ELECTRICAL CONDUCTIVITY.**
Revised ed.,
by John B. Heywood. 14 May 65, 3p. Contract DA36 039AMC03200E

Unclassified report

Pub. in AIAA Journal v3 n9 p1752-4 Sep 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 22 Mar 65.

Descriptors: (*Magnetohydrodynamics, Fluid flow), (*Electrical conductance, Temperature), Mathematical models, Compressible flow, Reynolds number, Equations, Velocity, Distribution, Boundary layer

It is the purpose of this work to demonstrate by analyzing a particularly simple model how these peculiar velocity distributions can occur even when the temperature distribution is approximately parabolic, and the effect of the MHD terms in the energy equation is small. A channel flow is chosen as the model since at high Hartmann numbers this illustrates several features of a boundary layer in that viscous forces are only important close to the channel walls.

**AD-623 061 Div. 25/3**
*KANSAS STATE UNIV MANHATTAN*
**A FINITE DIFFERENCE ANALYSIS OF LAMINAR MAGNETO-HYDRODYNAMIC FLOW IN THE ENTRANCE REGION OF A FLAT RECTANGULAR DUCT,**
by Ching-Lai Hwang, and Liang-Tseng Fan. 10 Sep 62, 18p.
AFOSR , 65-1430

Unclassified report

Pub. in Appl sci. Res. Sec.B v10 p329-43 1962 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Magnetohydrodynamics, Laminar flow), (*Laminar flow; Ducts), Rectangular bodies, Digital computers, Magnetic fields, Difference equations, Velocity, Pressure

The development of the velocity profile, from a uniform one at the entrance, for an electrically conducting fluid entering a semi-infinite flat duct with a transversely applied magnetic field is investigated. It is assumed that the fluid has constant physical properties, the duct walls are electrically nonconducting, a uniform magnetic field is imposed perpendicular to the duct walls, and there can be a net electrical current flow parallel to the walls and perpendicular to the flow direction with a variable external resistance connecting the two side plates, which are displaced at infinity. The basic governing continuity and momentum equations are expressed in finite difference form and solved numerically on a high-speed digital computer with a mesh network superimposed on the flow field. A practical mesh size ratio suitable for computation was determined. Results were obtained for the variations of velocity and pressure distribution between the inlet and the region for the fully developed velocity profile for Hartmann numbers of 0, 4, 10. (Author)

**AD-622 307** See Fld. 20/6

**AD-622 401** See Fld. 20/14

**AD-622 402** See Fld. 20/14

**AD-622 403** See Fld. 20/14

**AD-622 451** See Fld. 20/14

**AD-622 551** See Fld. 9/2

**AD-622 580** See Fld. 10

**AD-622 642** See Fld. 20/4

**AD-622 665** See Fld. 14/2

**AD-622 708** See Fld. 20/14

**AD-622 717** See Fld. 4/2

**AD-622 725** See Fld. 4/2

**AD-622 815** See Fld. 20

**AD-622 853** See Fld. 20/12

**AD-622 876** See Fld. 20/14

**AD-622 945** See Fld. 10

**AD-623 000** See Fld. 20/6

## 20/4. FLUID MECHANICS

**AD-622 356 Div. 9/2 ,25/8**
**CFSTI Prices: HC $13.95 MF $4.00**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PHYSICS OF SHOCK WAVES AND HIGH-TEMPERATURE HYDRODYNAMIC PHENOMENA,**
by Ya. B. Zeldovich, and Yu. P. Raizer. 30 Sep 65, 1095p. Rept. no. FTD-MT-64-514
TT , 65-64146

Unclassified report

Edited machine trans. of mono. Fizika Udarnykh Voln i Vysokotemperaturnykh Gidrodinamicheskikh Yavlenii, Moscow, 1963 632p. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Shock waves, Fluid dynamic properties), Gas flow, Aerodynamic characteristics, Thermodynamics, Thermal radiation, Heat transfer, High-temperature research, Shock tubes, Spectroscopy, Relaxation time, Plasma medium, Reaction kinetics, Astrophysics, USSR

Contents: Elements of gas dynamics and classical theory of shock waves; thermal radiation and radiant heat exchange in a medium; thermodynamic properties of gases at high temperatures; shock tubes; absorption and emission of radiation in gases at high temperatures; speed of relaxation processes in gases; structure of front of shock waves in gases; physico-chemical kinetics in hydrodynamic processes; light phenomena in shock waves and during strong explosion in air; thermal waves; shock waves in solids; certain self-similar processes in gas dynamics.

**AD-622 359 Div. 9/5 ,25/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**THE FUSION OF A METAL BODY IN THE VICINITY OF CRITICAL POINT,**
by B. I. Reznikov. 17 Sep 65, 13p. Rept. no. FTD-TT-65-866
TT , 65-64149

Unclassified report

Unedited rough draft trans. of Inzhenerno Fizicheskii Zhurnal (USSR) v8 n1 p93-7 1965.

Descriptors: (*Metals, Ablation), (*Ablation, Stagnation point), Mathematical analysis, Nonlinear systems, Boundary value problems, Taylor's series, Films, Blunt bodies, Pressure, USSR

An approximate analytical solution to the problem of ablation of a metal body near the stagnation point is considered. It is shown that the problem solution is reduced to integration of a non-linear boundary-value problem of the third order with supplementary condition for determination of the unknown thickness of the film. The precise solution of the boundary-value problem of interest is fairly approximated by the first terms of the Taylor series of the desired function near the zero point. This is confirmed by estimation of the residual term and by comparison with computed values. For fused metals the expression of the rate of ablation is found in a finite form to within 3-5% and may be approximated by the power dependence of the Mach number. The results of the steady-state theory are used for determination of ablation value when a body flies with a variable velocity and at a constant altitude. The dependence of ablation on pressure is found which corresponds to maximum ablation. (Author)

**AD-622 365 Div. 9/1 ,2/7 ,25/8**
**CFSTI Prices: HC $2.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**THE EFFECTS OF SURFACE CURVATURE AND PROPERTY VARIATION ON CELLULAR CONVECTION,**
by Stephen H. Davis, and Lee A. Segel. Oct 65, 37p. Rept. no. RM-4709-PR
Contract AF49 638 700 ,Nonr59108 Proj. NR962 190

Unclassified report

Prepared in cooperation with Rensselaer Polytechnic Inst., Troy, N. Y. Also supported by NSF.

Descriptors: (*Convection, Laminar flow), (*Laminar flow, Stability), Thermal expansion, Thermal diffusion, Viscosity, Perturbation theory, Surface properties, Temperature, Nonlinear differential equations

Linear and nonlinear effects on convection of surface curvature and fluid property variations with temperature are considered in a fluid layer heated from below. It is found that the critical Rayleigh number R and corresponding critical wave number of linear theory can each either increase or decrease slightly from its constant property values, depending on the exact nature of the small property variations. If at least one property is considered as temperature dependent, stable hexagonal cells are predicted whether or not surface deflection is taken into account. If all fluid properties are considered constant, stable hexagonal cells are predicted for a layer bounded by a rigid plane below and a free surface above only if surface deflection is taken into account. Twodimensional 'rolls' are predicted as the stable convective mode in two cases: (i) when R exceeds its linear-theory critical value, if hexagons are unstable, and (ii) at a somewhat higher value of R, if hexagons are stable. (Author)

**AD-622 370 Div. 9/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**LEEWARD DEPOSITION OF PARTICLES ON CYLINDERS FROM MOVING AEROSOLS.**
Technical rept.,
by Gabrielle Asset, and Thomas G. Hutchins. Aug 65, 33p. Rept. no. CRDLR-3300
Task 1C522301A06001

Unclassified report

Descriptors: (*Aerosols, Distribution), (*Particles, Distribution), Cylindrical bodies, Wind tunnels, Wind, Reynolds number, Gas flow, Particle size, Turbulence, Vortices, Styrene plastics, Powders, Glass, Rods

A study of leeward (back) deposition of moving aerosols on cylinders was conducted in a wind tunnel. Cylinder sizes were varied from 3.1 to 41 mm in diameter, aerosol particles from 4.5 microns to 110 microns in diameter, and wind velocities from 3 to 18 mph. There was little leeward deposition of particles over 100 microns in diameter, an intermediate amount of deposition of particles between 10 microns and 100 microns in diameter (depending on conditions), and a large deposition of particles below 10 microns in diameter at velocities from 3 to 18 mph. The ratio of leeward and windward particle count deposits on the cylinders were calculated from experimental results. The impaction parameter K and the Reynolds number of the airflow around the cylinder were also calculated. When K was greater than the critical value of 0.0625, the ratio was 0.4% or less, and showed no variation with particle size, cylinder diameter, and wind velocity. When K was less than 0.0625, the ratio ranged from about 0.5% to 131%. In general, the ratio increased with decreasing particle size and wind velocity and with increasing cylinder diameter. (Author)

**AD-622 390 Div. 9/6**
*TECHNISCHE HOCHSCHULE AACHEN (WEST GERMANY) INSTITUT FUER MECHANIK*
**SECOND ORDER BOUNDARY LAYER THEORY FOR CURVED WALLS.**
Annual summary rept. no. 5, 1 Sep 64-31 Aug 65, by F. Schultz-Grunow. 31 Aug 65, 69p. Contract AF61 052 744
ARL , 65-198

Unclassified report

Available only for reference use at DDC Field Services. Copy is not available for public sale.

Descriptors: (*Laminar flow, Curved profiles), (*Laminar boundary layer, Curved profiles), Heat transfer, Incompressible flow, Flat plate models, Camber, Wedges, West Germany

The present work deals with incompressible plane and steady laminar boundary layer flow free of speration along semi-infinite walls with longitudinal curvature. The second order approximation is taken in account. The general condition for self similar solutions and the corresponding differential equation are derived, which include as limiting cases for zero wall curvature the flows along a flat plate and along a wedge as well as the stagnation point flow at a circular cylinder. Constant pressure along the wall corresponds to walls curved like evolvents of a circle with sharp leading edge. A transformation is introduced which simplifies the analysis considerably and yields formal analogies to the plane wall. Furthermore the influence of curvature on heat transfer for walls of constant temperature and for isolated walls is determined in dependency of Prandtl number. Some of the results are the increase of shear stress and heat transfer at concave and decrease at convex walls, the influence on the exponent of the Prandtl number in the expression for the Nusselt number. Reference is payed to previous attempts and to numerical results obtained by the second order singular perturbation theory applied to a circular cylinder in cross flow. (Author)

**AD-622 395 Div. 9/6 ,9/7**
**CFSTI Prices: HC $7.50 MF $2.00**
*NORAIR DIV NORTHROP CORP HAWTHORNE CALIF*
**TURBULENT WALL PRESSURE FLUCTUATIONS UNDER SEPARATED SUPERSONIC AND HYPERSONIC FLOWS.**
Final technical rept. for 13 Jun 63-1 Mar 65, by J. D. Revell, and R. E. Gleason. Aug 65, 449p. Rept. no. NOR-65-4
Contract AF33 657 11712 Proj. 1471 Task 147102
FDL , TR-65-77

Unclassified report

Descriptors: (*Supersonic flow, Turbulence), (*Turbulence, Pressure), Analysis of variance, Separation, Hypersonic flow, Structures, Aerodynamic loading, Aerospace craft, Reentry vehicles, Compressible flow, Model tests, Shock waves, Oscillation, Base flow

The objective of the project was to conduct an exploratory theoretical and limited experimental program to obtain the parameters that are important in the occurrence, magnitude, frequency content, and effective areas of forcing functions arising from separated flow, wakes, base pressure fluctuations, and oscillating shock waves. Two models were used to obtain pressure fluctuation data generated by the above mentioned phenomena from wind tunnel tests. These models were purposely constructed to generate separated flows, oscillating shock waves, and base pressure fluctuations. The fluctuating pressure data obtained during the tests were reduced in the form of one-third octave band spectra. These reduced data are compiled. Analyses of these data were made, and are given. Comparisons were made of the effects of Mach number, angle of attack, frequency, and Strouhal number on the sound pressure levels generated. (Author)

**AD-622 431 Div. 9/6 ,9/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*RAND CORP SANTA MONICA CALIF*
**INVISCID CONE FLOWS WITH SURFACE MASS TRANSFER,**
by Jerome Aroesty, and Stephen H. Davis. Sep 65, 8p. Rept. no. P-3231

Unclassified report

Descriptors: (*Conical bodies, Aerodynamic characteristics), (*Aerodynamic characteristics, Transport properties), (*Transport properties, Surfaces), Surface properties, Mathematical analysis, Compressible flow, Incompressible flow, Gas flow

The paper discusses a simple, exact solution of the inviscid equations of motion which includes the effect of surface mass transfer. The slip surface location is determined solely from the solution of the injectant flow field.

**AD-622 452 Div. 9/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**EFFECT OF UNEQUILIBRIZED DISSOCIATION ON FLOW AROUND BLUNT-NOSED BODIES,**
by Yu. P. Lunkin, and M. P. Shtengel. 30 Sep 65, 10p. Rept. no. FTD-TT-65-649
TT , 65-64177
Unclassified report

Unedited rough draft trans. of Politekhnicheskii Institut, Leningrad. Trudy (USSR) n230 p7-12 1964.

Descriptors: (*Blunt bodies, Gas flow), (*Dissociation, Fluid dynamic properties), Shock waves, Mathematical analysis, USSR, Diatomic molecules

Consideration is given to the effect of unequilibrized dissociation of a diatomic gas on the position of the shock wave and the profile of the gas-dynamic parameters along the zero line of the flow of a blunt-nosed body. (Author)

**AD-622 464 Div. 9/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**AERODYNAMIC RESISTANCE OF SMOOTH-PIPE STAGGERED BUNDLES IN A CROSS FLOW OF AIR AT HIGH RE NUMBERS,**
by Yu. K. Stasyulyavichyus, and P. S. Samoshka. 22 Sep 65, 11p. Rept. no. FTD-TT-65-1152
TT , 65-64189
Unclassified report

Unedited rough draft trans. of Akademiya Nauk Litovskoi SSR, Vilna. Trudy. Seriya B. n4 (35) p83-8 1963.

Descriptors: (*Pipes, Drag), (*Drag, Pipes), Stability, Stagnation point, Turbulence, Aerodynamic configurations, Gas flow, USSR

An experimental investigation was made of the resistance of five smooth-pipe staggered bundles a/b = 1.27 -1.94 in a cross flow of air in the interval Re of from 10,000 to 2,000,000. The dependence of the resistance of the bundles on the number of longitudinal rows z2 was investigated. It was established that the character of the resistance stabilizes at seven longitudinal rows and does not depend on further increase in the number of them. The results were evaluated in criterial form and the graphic dependences are given. Analysis of the material obtained showed that in the region Re = (1.8--1.6) x 100,000 there begins the transition into the self-modeling zone of developed turbulence. In close-staggered bundles (a/b< or =1.7), the self-modeling zone occurs immediately, but in less close ones (a/b>1.7) the automatic operation sets in after the transition zone. (Author)

**AD-622 522 Div. 9/2 ,9/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS AERODYNAMIC LAB*
**SIMILITUDE REQUIREMENTS FOR A DISSOCIATING DIATOMIC GAS.**
Technical rept.,
by Darrell Brooke. Aug 65, 35p. Rept. no. TR-6
Contract AF33 657 10416 Proj. 1426 Task 142604
FDL , TR-65-100
Unclassified report

Descriptors: (*Dissociation, Diatomic molecules), (*Nonequilibrium flow, Hypersonic flow), (*Hypersonic flow, Shock waves), Reentry vehicles, Atmosphere entry, Chemical equilibrium, Vibration, Mathematical analysis

The flow of a dissociating diatomic gas behind a strong shock wave is examined and a parameter for the scaling of the length of the non-equilibrium region is obtained. The dissociation similarity parameter is verified for nitrogen by comparing it with the results of numerical integrations of the equations of motion and the dissociation rate equation behind a strong shock wave. A relationship between the temperature in the dissociation region and the degree of dissociation is obtained for the flow behind a strong shock wave. This relationship is simplified and the resulting approximation is shown to be good within 10 per cent. An expression relating the temperature to the distance through the dissociation region was obtained for nitrogen. This relation, which is empirical in nature, gives a method for rapidly calculating the temperature profiles through the dissociation region behind a strong shock wave in nitrogen. (Author)

**AD-622 531 Div. 9/2**
*QUARTERMASTER RESEARCH AND ENGINEERING CENTER NATICK MASS*
**JET-COMPRESSOR EFFICIENCIES AS INFLUENCED BY THE NATURE OF THE DRIVING AND DRIVEN GASES,**
by Suzanne S. Eichacker, and Harold J. Hoge. 2 Apr 60, 2p.
Unclassified report

Pub. in Journal of the Aerospace Sciences v27 n8 p636-7 Aug 1960 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Mixed-flow compressors, Effectiveness), (*Gas flow, Compressible flow), Jet mixing flow, Fluid flow, Compressive properties, Fluid dynamic properties, Supersonic flow, Helium, Air, Gases, Halogenated hydrocarbons

The efficiency of a jet compressor (ejector) was shown to be highest when the driving fluid is a gas of high molecular weight and heat capacity and the driven fluid is a gas of relatively low molecular weight and heat capacity. Previously reported research on the air:air system (Hoge, H. J., S. S. Eichaker, and D. L. Fiske. Studies of jet compression1. Apparatus and methods. Results with air at room temperature. J. Basic Engineering, Trans. Am. Soc. Mech. Eng. Series D, v.81:426-432 (1959)) was extended to systems of air, Freon-12, Freon-113, CO2, and helium. The maximum efficiency was 0.489, reached with the system helium: Freon-113. With a given ejector, the efficiency of self entrainment did not change much from gas to gas.

**AD-622 565 Div. 9/1 ,9/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES*
**SOME PHYSICAL CONSIDERATIONS OF THE HYDRODYNAMIC STABILITY OF PARALLEL FLOWS OF A DUSTY GAS,**
by J. T. C. Liu. Jul 65, 33p. Rept. no. 745
Contract AF49 638 1271 Proj. 7064
Unclassified report

Descriptors: (*Gas flow, Stability), (*Aerosols, Fluid dynamic properties), Shear stresses, Kinetic theory, Energy, Turbulence, Viscosity, Vortices, Velocity, Mathematical analysis, Dust

Some of the physical implications of the stability of parallel flows of a dusty gas are studied. The energy balance of such a disturbed flow shows that the increase or decrease of the overall (gas plus particle) disturbance kinetic energy depends upon the relative magnitude of (1) energy dissipation due to the usual gas viscosity and augmented by the work done due to particle-gas interaction, and (2) energy conversion from the mean flow to the disturbances by both the gas and the particle Reynolds shear stresses. The viscous sublayer structure, where viscosity is known to be destabilizing, is deduced. It is shown that augmented phase shift of the gas velocity components, due to particle-gas interaction, tends to decrease the gas Reynolds shear stress but is eventually offset by their relative magnitude increase.

**AD-622 566 Div. 9/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*PRINCETON UNIV N J GAS DYNAMICS LAB*
**MARKOV CHAIN THEORY OF FREE-MOLECULE FLOW,**
by Yau Wu. Dec 64, 21p. Rept. no. 711
Contract AF49 638 1271 Grant ,NSF GK59
AFOSR ,N65 65-0193; ,18462
Unclassified report

Descriptors: (*Probability, Gas flow), (*Molecular beams, Probability), Mathematical models, Stochastic processes, Molecules

The motion of molecules can be described by a stochastic process if and only if one chooses a stochastic boundary condition in which the properties of reflected molecule is not uniquely determined by the properties of the incident molecule, but depends only on the properties of the local surface condition (e.g. the diffuse reflection law is a stochastic boundary condition). In this paper, a mathematical model has been proposed which describes the motion of each molecule by probability function in a multi-reflection system (such as internal flow or external flow with nonconvex body) in terms of its initial probability function and successive transition probabilities in a discrete sample space. The successive transition probability functions are determined from the diffuse reflection law and the geometry of the system, and are independent of time. Such a mathematical model is equivalent to a stationary Markov chain process in probability theory.

**AD-622 567 Div. 9/5 ,25/7**
**CFSTI Prices: HC $2.00 MF $0.50**
*STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS*
**PROBLEMS IN ABLATION.**
Technical rept.,
by L. Bourely. May 65, 35p. Rept. no. TR-13, SUDAER-233
Contract Nonr22530 Proj. NR064 425
Unclassified report

Descriptors: (*Ablation, Reentry vehicles), (*Reentry vehicles, Ablation), Heat shields, Pressure, Friction, Hypersonic characteristics, Integral transforms, Fourier analysis

The velocities of particles of a viscous solid on the free surface of an ablative body submitted to hypersonic re-entry conditions are analytically determined. The viscosity of the liquid formed during the ablative process is considered to be constant. The problem is treated with the aid of Hankel transforms for a semi-infinite flat body submitted to normal pressure and skin friction on its plane boundary. A viscous liquid layer uniformly spread on a solid sphere is also considered and the solution is given in the form of a Fourier series with the boundary conditions represented approximately. (Author)

**AD-622 588 Div. 9/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS*
**INTERACTION OF A DISTRIBUTED SURFACE**

**VIBRATION WITH AN ADJACENT STEADY FLUID FLOW.**
Interim technical rept. no. 2,
by Manfred A. Heckl, and Francis J. Jackson. 13 Sep 65, 41p. Contract Nonr394400 Proj. SR009 01 01 Task 104

Unclassified report

Descriptors: (*Turbulent boundary layer, Vibration), (*Boundary layer transition, Fluid dynamic properties), Oscillation, Laminar flow, Boundary layer, Surface properties, Fluid flow, Distribution, Vortices

An analysis is presented describing, in an idealized manner, the oscillatory flow field generated in viscous fluid supported by a flat plate, when the plate surface is excited into a transverse standing wave pattern by external means. The analysis proceeds to include the influence of a constant D.C. flow on the oscillatory fluid motion for the case of both standing and travelling surface waves. The ultimate aim of such studies has been to ascertain whether or not the transition of a laminar flow into turbulent flow could be delayed by active excitation of the boundary; or, whether or not such oscillation can modify the turbulent flow field should transition occur. An attempt is made to include the effects of the steady flow boundary layer profile on the total flow field, by a piecewise superposition of adjacent constant velocity layers of increasing magnitude as the distance from the boundary increases. This idealized model suggests qualitatively the conditions under which amplification of the boundary layer disturbances produced by the vibrating surface may occur, as they are transmitted through a steady flow boundary layer. (Author)

**AD-622 591 Div. 9/7 ,9/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*GENERAL ELECTRIC CO PHILADELPHIA PA MISSILE AND SPACE DIV*
**THE DIRECT MEASUREMENTS OF MOLECULAR VELOCITY DISTRIBUTION FUNCTIONS.**
Final rept.,
by E. P. Muntz. 31 Mar 65, 5p. Contract AF49 638 1152 Proj. 9783 Task 978301
AFOSR , 65-0808

Unclassified report

Descriptors: (*Superaerodynamics, Statistical functions), (*Statistical functions, Velocity), Measurement, Molecular properties, Jets, Helium, Wind tunnels, Electron beams, Recording systems, Doppler effect, Line spectrum

A brief summary of the research conducted is presented. During the investigation it was demonstrated that the Doppler profile of the 5015.67A helium line excited by a beam of 20 kv electrons can be used to measure distribution functions. The first interference free measurements of a distribution function in a free jet expansion were made, and resonance diffusion of the emission by an electron beam was considered relative to a decrease in spacial resolution. The etalon system and the recording system were improved so that nonequilibrium distribution function measurements will be possible in wind tunnel laboratory environments. (Author)

**AD-622 596 Div. 9/1**
*MICHIGAN UNIV ANN ARBOR*
**MOTION OF A SPHERE IN A ROTATING FLUID AT SMALL REYNOLDS NUMBERS,**
by Philip K. Davis. 27 Nov 64, 8p.
AROD , 3564:7

Unclassified report

Pub. in Physics of Fluids v8 n4 p560-7 Apr 1965 (Copies not available to DDC or Clearinghouse customers). Research supported in part by NSF.

Descriptors: (*Spheres, Motion), Fluid dynamic properties, Rotation, Reynolds number, Velocity, Oils, Density, Acceleration

The slow steady rise of a solid sphere along the axis of a uniformly rotating viscous liquid is studied when the Reynolds number, based on the translational velocity along the axis of rotation, is less than unity. The terminal velocity of a sphere rising slowly along the axis of a uniformly rotating viscous liquid was determined experimentally. Spheres of varying sizes with a density less than that of the fluid were released at the bottom of a rotating cylinder filled with castor oil. The subsequent terminal velocities along the axis of rotation were measured. It was found that the rise velocity decreases from the Stokes velocity as the angular speed of rotation is increased. The governing equations show that this is due to the Coriolis acceleration. (Author)

**AD-622 611 Div. 9/7**
**CFSTI Prices: HC $4.00 MF $0.75**
*TOLEDO UNIV RESEARCH FOUNDATION OHIO*
**AN INVESTIGATION OF DIFFUSION OF SUPERSONIC FLOWS IN CURVED CONSTANT AREA PASSAGES.**
Final rept.,
by George L. Heath. Sep 65, 119p. Contract AF33 616 8271 Proj. 7116 Task 711601
ARL , 65-179

Unclassified report

Descriptors: (*Supersonic flow, Diffusion), Kinetic theory, Energy, Reduction, Pressure, Statics, Schlieren photography, Shock waves, Boundary layer, Separation, Diffusers

The experimental investigation was undertaken for the purpose of gaining an insight into the phenomena which occur in the process of diffusion of supersonic flow in curved passages of constant cross sectional area. An effort is made toward determining the magnitude of the losses associated with the recovery of kinetic energy in these passages. Results toward this end are presented in the form of static pressure distributions along the passages, total pressure surveys at the passage exit and Schlieren photographs of the flow in the passages. (Author)

**AD-622 626 Div. 9/1 ,25/5**
*CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS*
**VORTICES IN AN IMPERFECT BOSE GAS. I. THE CONDENSATE,**
by Alexander L. Fetter. 7 Oct 64, 9p. Contract AF AFOSR130 63
AFOSR , 65-1342

Unclassified report

Pub. in the Physicsl Review v138 n2A pA429-37 Apr 19 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Vortices, Bosons), (*Liquefied gases, Helium), (*Quantum mechanics, Vortices), Condensation, Phase studies, Quantum statistics, Hydrodynamics, Calculus of variations, Complex variables

A theoretical study of rectilinear vortices in an imperfect Bose gas shows a close correspondence with classical hydrodynamics. The energy and momentum of a vortex pair in an unbounded fluid are calculated. The similarity between a vortex pair and a vortex ring leads to an estimate of the critical velocity v of liquid He II in a tube of radius R that includes the effect of the walls v Ch/4mRpi, where C is a constant of order unity. A variational treatment of a system of many identical vortices in a container shows that the energy is lowest for a uniform distribution, and that the number of vortices per unit area n agrees with Feyman's result n=2m omega/h. In the classical limit (h approaches 0), the angular momentum and energy approach the values for solid-body rotation. (Author)

**AD-622 631 Div. 9/4**
**CFSTI Prices: HC $3.00 MF $0.50**
*DAVID TAYLOR MODEL BASIN WASHINGTON D C HYDROMECHANICS LAB*
**EXPERIMENTAL MEASUREMENTS OF THE STEADY LIFT, DRAG, AND MOMENT ON SURFACE-PIERCING STRUTS.**
Final research and development rept.,
by Gene M. Wilburn, and H. Smith Haller,Jr.. Oct 65, 52p. Proj. SS600 000 Task 1703
DTMB , 1778

Unclassified report

Descriptors: (*Hydrofoils, Model tests), Lift, Drag, Moments, Surface properties, Wake, Cavitation, Angle of attack, Test equipment, Pressure, Configuration, Ogives, Pitch (Motion), Oscillation, Experimental data, Dynamometers

Testing of two surface-piercing strut configurations for the Pitch-Heave Oscillator is described. Experimental measurements were made of the steady lift, drag, and moment on two rectangular planform, finite aspect ratio struts at finite Frounde numbers. The first model section had identical symmetrical ogival fairings on the leading and trailing edges and a flat center section. For the second configuration the aft ogive fairing was cut off the first model section, and a square trailing edge was left. The model force and moment coefficients are presented and the wake, spray, and cavitation characteristics of both profiles are discussed. Preliminary computations of the theoretical pressure distributions for 8 two-dimensional sections and computed full-scale forces and moments for the PHO-2 strut configuration are included. (Author)

**AD-622 642 Div. 9/1 ,25/3**
*MARYLAND UNIV COLLEGE PARK INST FOR FLUID DYNAMICS AND APPLIED MATHEMATICS*
**THE TRANSPORTATION OF MAGNETIC LINES OF FORCE BY A HIGHLY CONDUCTING FLUID,**
by J. M. Burgers. 16 Jun 64, 23p. Contract AF AFOSR141 64
AFOSR , 65-1471

Unclassified report

Pub. in J. Soc. Indust. Appl. Math. v13 n1 p184-205 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Transport properties, Fluids), (*Magnetohydrodynamics, Electrical conductance), Magnetic fields, Motion, Particles, Upper atmosphere

**AD-622 660 Div. 9/1 ,15/1**
*BOSTON UNIV MASS*
**WIENER-HERMITE EXPANSION IN MODEL TURBULENCE IN THE LATE DECAY STAGE,**
by Armand Siegel, and Tsutomu Imamura. 12 Jun 64, 15p. Contract AF AFOSR557 64

Unclassified report

Pub. in Journal of Mathematical Physics v6 n5 p707-21 May 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Minnesota Univ., Minneapolis.

Descriptors: (*Turbulence, Statistical analysis), (*Series, Turbulence), Partial differential equations, Iterative methods, Velocity, Mathematical models, Functional analysis, Integrals

The Wiener-Hermite functional expansion, which is the expansion of a random function about a Gaussian function, is here substituted into the Burgers one-dimensional model equation of turbulence. The result is a hierarchy of equations which (along with initial conditions) determine the kernel functions which play the role of expansion coefficients in the series. Initial conditions are postulated, based on physical reasoning, criteria of simplicity, and the assumption that the series is to represent the late decay stage (in which the Gaussian correction is small and also decreasing with time). These are shown to justify an iterative solution

to the equations. The first correction to the Gaussian approximation is calculated. This is then tested by evaluating the correction to the flatness factor, which for an exactly Gaussian function has the value 3, but which has been found by experiment (in real three-dimensional fluids, of course) to have a value which deviates from the Gaussian value increasingly rapidly with the order of the derivative. This effect is utilized as a test of the inherent ability of the Wiener-Hermite expansion to bring to realization the physical properties implicit in the NavierStokes or Burgers equations. The various contributions to the flatness-factor deviation, when computed, do show a potential capability of providing a theoretical basis for the effect. (Author)

**AD-622 664 Div. 9/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*POLYTECHNIC INST OF BROOKLYN N Y*
**ISOBARIC HOMOGENEOUS MIXING BY INTEGRAL METHODS,**
by Luigi G. Napolitano. 1965, 46p. Contract AF49 638 217 Proj. 17500
AFOSR , TN-58-128

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Jet mixing flow, Numerical methods + procedures), (*Integral transforms, Numerical methods + procedures), Fluid mechanics

**AD-622 720 Div. 9/1 ,25/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS*
**THEORY OF BOUNDARY LAYER NOISE.**
Final rept.,
by John E. Ffowcs Williams. 13 Jul 65, 36p.
Rept. no. BBN-1301
Contract Nonr428500

Unclassified report

Descriptors: (*Noise, Theory), (*Boundary layer, Noise), Turbulence, Vibration, Sound, Pressure, Fluid mechanics

Contents: Mechanism of noise generation in a turbulent boundary layer; Vibration induced by boundary layer turbulence; Surface-pressure fluctuations induced by boundary-layer flow at finite mach number; Sound radiation from turbulent boundary layers formed on compliant surfaces; and The influence of simple supports on the radiation from turbulent flow near a plane compliant surface.

**AD-622 746 Div. 9/1**
*POLYTECHNIC INST OF BROOKLYN FREEPORT N Y AEROSPACE INST*
**LINEARIZED ANALYSIS OF DIFFUSING, RELAXING GAS FLOW,**
by Pasquale M. Sforza, and Martin H. Bloom. 28 Feb 64, 10p. Contract AF AFOSR1 63 Proj. 9781 Task 978101
AFOSR , 65-1232

Unclassified report

Pub. in Physics of Fluids v8 n1 p36-43 Jan 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gas flow, Analysis), Diffusion, One-dimensional flow, Linear systems, Relaxation time, Jet mixing flow, Wake, Diatomic molecules, Perturbation theory

A linearized model of an ideal diatomic gas with diffusion processes and rate reaction is applied to one-dimensional unsteady motion generated by initial nonuniformities of state and velocity. The timedependent system resembles that of steady free-mixing of jet or wake type, with two space coordinates. The temporal and spatial character of the profiles of flow variables is studied analytically under two sets of conditions. First considered is the case of unit Lewis number and for this case the investigation is subdivided as follows: (1) Zero mass motion with state nonuniformities for planar, cylindrical, and spherical configurations; and (2) nonzero mass motion with state nonuniformities for the planar and cylindrical configurations. Secondly, the case of arbitrary, but constant, Lewis number is considered. In this instance, the investigation is limited to nonzero mass motion with state nonuniformities in the planar geometry. In all cases the Prandtl number is assumed to be an arbitrary constant. Analytic solutions are obtained for all cases and various parametric effects discussed. (Author)

**AD-622 769 Div. 9/4 ,9/7**
**CFSTI Prices: HC $3.00 MF $0.75**
*DAVID TAYLOR MODEL BASIN WASHINGTON D C HYDROMECHANICS LAB*
**STEADY TWO-DIMENSIONAL PRESSURE DISTRIBUTIONS ON ARBITRARY PROFILES,**
by Terry Brockett. Oct 65, 85p. Proj. S R009 01 01
DTMB , 1821

Unclassified report

Descriptors: (*Pressure, Distribution), (*Airfoils, Pressure), (*Hydrofoils, Pressure), Curved profiles, Conformal mapping, Numerical analysis, Programming (Computers), Cavitation, Potential theory

A method of determining two-dimensional pressure distributions on arbitrary foils is explained. The development is based on an approximate potential theory suggested by Moriya which is empirically modified in a manner suggested by Pinkerton to give an arbitrary lift for a set incidence and at the same time satisfy the Kutta condition. Interpolation functions for the ordinates are used to reduce the calculations to a straightforward numerical procedure which is easily programmed for machine calculations. (FORTRAN statements for such a computer program are included.) The results are those of Riegels. Comparisons are made with other theoretical methods for potential flow and with experimental results. Good agreement with both calculated and measured pressure distributions is found when the lift coefficients are matched. The assumption that cavitation occurs when the local pressure falls to the vapor pressure is not upheld for the cases considered. (Author)

**AD-622 802 Div. 9/7**
**CFSTI Prices: HC $2.00 MF $0.50**
*OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS AERODYNAMIC LAB*
**PRESSURES ON CIRCULAR CYLINDERS IN EQUILIBRIUM AND NONEQUILIBRIUM HYPERSONIC AIR FLOWS.**
Final rept. for 1 Jan 63-31 Mar 65,
by S. L. Petrie, and G. M. Gregorek. Aug 65, 34p. Contract AF33 657 10416 Proj. 1426 Task 142604
FDL , TR-65-99

Unclassified report

Descriptors: (*Hypersonic wind tunnels, Effectiveness), (*Cylindrical bodies, Hypersonic flow), (*Aerodynamic loading, Cylindrical bodies), Atmosphere entry, Simulation, Reentry vehicles, Stagnation point, Enthalpy, Wind tunnels, Nonequilibrium flow, Pressure, Blunt bodies

Pressure distributions on circular cylinders were measured in arc-heated and perfect gas wind tunnels. The flow Mach numbers were near 7 at Reynolds numbers based on cylinder diameter from 160 to 1000. The stagnation enthalpies varied from 250 to 5050 BTU/lb sub m. For locations on the cylinder beyond 20 degrees from the stagnation point, the pressures determined in the perfect gas tunnel were found to be higher than those obtained from the arc-heated wind tunnel. Various possible causes for the discrepancies in pressures are examined. The results indicate the possible existence of rotational nonequilibrium in the cylinder shock layer for the high enthalpy tests. (Author)

**AD-622 831 Div. 9/7 ,9/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*BOEING CO SEATTLE WASH AEROSPACE GROUP*
**EXPERIMENTAL AND THEORETICAL PANEL FLUTTER STUDIES IN THE MACH NUMBER RANGE OF 1.0 TO 5.0,**
by E. H. Dowell. Aug 65, 25p. Contract AF33 616 8081 Proj. 1370 Task 137003
ASD , TDR-63-449 S1

Unclassified report

Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.

Descriptors: (*Panels (Structural), Flutter), (*Flutter, Panels (Structural)), Transonic flow, Supersonic flow, Hypersonic flow, Mathematical analysis

Three different theoretical analyses were carried out to better define the panel flutter boundary for simple panels. An analysis omitting the off-diagonal stiffness coupling terms and one that replaced the diagonal stiffness terms with eigenvalues of the complete stiffness matrix gave similar results. A method with the offdiagonal terms retained resulted in values of the flutter parameter that differed by approximately 30% from the two previously mentioned methods. This 30% difference in flutter dynamic pressure was for a/b = 4.0 and this difference approaches zero as a/b approaches zero. The change in natural frequency due to the inclusion of the off-diagonal stiffness terms had only a small effect on the flutter boundary. It was concluded that the change in the flutter boundary was brought about by the difference in panel natural mode shapes and thus increased the importance of accurately measuring the mode shapes. (Author)

**AD-622 843 Div. 9/2**
*CALIFORNIA UNIV BERKELEY COLL OF ENGINEERING*
**VECTOR POLAR METHOD FOR THE EVALUATION OF WAVE INTERACTION PROCESSES.**
by A. K. Oppenheim, P. A. Urtiew, and A. J. Laderman. 1964, 57p. Contract AF AFOSR129 64 Proj. 9711 Task 971101
AFOSR , 65-1479

Unclassified report

Pub. in Archiwum Budowy Maszyn v11 n3 p441-95 1964 (Copies available only to DDC users).

Descriptors: (*Mechanical waves, Vector analysis), (*Shock waves, Vector analysis), Shock tubes, Fluid dynamic properties, Graphics, Acoustics, Field theory, Propagation, Convergent divergent nozzles, Deflagration

Vector polar method is a graphical technique for the solution of wave interaction problems that are concerned with the overall results rather than with the progress of the process. The method is based on the use of wave polars, that is diagrams representing the loci of states attained by a given wave process in a coordinate system of which one component is pressure or velocity of sound and the other is particle velocity. Furthermore, if the ratio of pressures or sound speeds is represented on a logarithmic scale, usually as the ordinate, while the abscissa represented the change in particle velocity across the wave in a linear scale, then such a generalized hodograph plane has the property of a vector field, that is, the change of state brought about by the wave action is expressed in terms of a vector between the origin and any point of the polar. By simple vector addition one can then evaluate rapidly some quite complex wave interaction processes. The utility of the method is illustrated by a variety of shock-tube problems involving interactions between shocks, deflagrations, rarefaction waves, contact discontinuities and area change. Although the analysis of most of such problems is known, the application of the

vector polar method led to the discovery of some interesting regimes of solutions that would be difficult to discern by the more laborious conventional techniques. (Author)

**AD-622 848 Div. 9/1 ,25/5**
*CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS*
**VORTICES IN AN IMPERFECT BOSE GASE. II. SINGLE-PARTICLE EXCITATIONS,**
by Alexander L. Fetter. 2 Dec 64, 8p. Contract AF AFOSR130 63 Proj. 9767 Task 976701
AFOSR , 65-1343

Unclassified report

Pub. in Physical Review v138 n3A pA709-16 May 3 1965 (Copies not available to DDC or Clearinghouse customers). See also AD-622 626.

Descriptors: (*Vortices, Bosons), (*Excitation, Bosons), Quantum mechanics, Hydrodynamics, Condensation, Green's function, Phase shift, Phonons, Potential theory

The single-particle excitations of an imperfect Bose gas with a vortex in the condensate are studied using the Bogoliubov approximation. The problem is reduced to an eigenvalue equation, whose solution yields both the single-particle energies and the eigenfunction expansion of the single-particle Green's function. The spectrum of the eigenvalues contains a discrete portion (bound states) and a continuous portion (scattering states). The lowest eigenvalue corresponding to angular momentum l = 0 and l = =1 is determined variationally. In the long-wavelength limit, the eigenvalue for l = =1 agrees with the frequency of normal modes calculated by Kelvin and Pitaevskii. The density of noncondensed particles is expressed in terms of the single-particle Green's function and is shown to be finite at the center of the vortex. (Author)

**AD-622 875 Div. 9/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*GRUMMAN AIRCRAFT ENGINEERING CORP BETHPAGE N Y*
**STUDY OF HYDROFOIL SINGING.**
Final rept. for 1 May 64-31 Aug 65,
by Joseph W. Bradley, and James Rogers. Aug 65, 75p. Contract Nonr457700 Proj. SS600 Task 1719

Unclassified report

Descriptors: (*Hydrofoils, Elasticity), (*Acoustic properties, Hydrofoils), Noise, Frequency, Oscillation, Vibration, Failure (Mechanics), Angle of attack, Damping, Resonance, Hydrodynamics

An experimental investigation of hydrofoil 'singing' was conducted. A supercavitating model hydrofoil was operated in a high speed whirling tank from 25 through 80 knots at selected angles of attack, various flow conditions and mechanical constraints. The hydrofoil was found to 'sing' readily as specific attack angles for speeds of 45 knots and above. 'Singing' is present when the hydrofoil is fully wetted on the lower hydrofoil surface and either fully or partially wetted on the upper hydrofoil surface. The predominant 'singing' frequencies, which remained constant regardless of speed, were associated with fundamental resonances of the hydrofoil, such that it bent chordwise rather than spanwise, causing large oscillations of the leading edge. The maximum 'singing' amplitude also remained constant over the entire velocity range. 'Singing' started intermittently previous to steady-state 'singing'. Indications are that the 'singing' phenomenon is a selfexcited system and the controlling parameter is angle of attack at all speeds of 45 knots and above. Hydrofoil 'singing' was completely eliminated by the use of a rubber damping material that restrained the tip chords of the hydrofoil. (Author)

**AD-622 924 Div. 9/1**
*MARYLAND UNIV COLLEGE PARK*
**UNSTEADY THREE-DIMENSIONAL LAMINAR JET MIXING OF A COMPRESSIBLE FLUID.**
Revised ed.,
by S. I. Pai. 31 Dec 64, 5p. Contract AF AFOSR141 65
AFOSR , 65-1472

Unclassified report

Pub. in AIAA Journal v3 n4 p617-21 Apr 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 4 Jun 64.

Descriptors: (*Jet mixing flow, Compressible flow), Three-dimensional flow, Laminar flow, Equations, Stability, Axially symmetric flow, Enthalpy

The fundamental equations of an unsteady three-dimensional laminar jet mixing of a compressible fluid were discussed. These equations are simplified by introducing two stream functions. Finally, the unsteady jet flow that deviates slightly from an unsteady uniform flow is studied in detail. It was found that, for arbitrary three-dimensional jets, the velocity and temperature distributions tend to be axisymmetrical at large time-from-start and far downstream. Some numerical examples are given. (Author)

**AD-622 932 Div. 9/7 ,9/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**MIXING OF CONCENTRIC HIGH VELOCITY AIR STREAMS.**
Collection of abstract.
6 Feb 64, 16p. Rept. no. AID-U-64-3
TT , 65-64277

Unclassified report

Consists of abstracts of articles selected from Soviet open literature, Jan 62-Jun 63.

Descriptors: (*Jet mixing flow, Aerodynamic characteristics), Air, USSR, Supersonic flow, Nozzle gas flow, Jets, Gas flow, Combustion, Heat transfer, Turbulence, Thermodynamics, Reviews

The report is the first in a series dealing with published Soviet research on the subject of the mixing of concentric high velocity air streams. It consists of abstracts of articles selected from Soviet open literature available at the Aerospace Information Division and the Library of Congress, and covers the period from January 1962 through June 1963. (Author)

**AD-622 933 Div. 9/7 ,9/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**MIXING OF CONCENTRIC HIGH VELOCITY AIR STREAMS.**
Compilation of abstracts.
16 Apr 64, 41p. Rept. no. AID-U-64-24
TT , 65-64278

Unclassified report

Consists of abstracts of articles selected from Soviet open literature. See also AD-622 932.

Descriptors: (*Jet mixing flow, Aerodynamic characteristics), Air, USSR, Jets, Turbulence, Gas flow, Ionization, Combustion, Reviews

The report is the second in a series dealing with published Soviet research on the subject of the mixing of concentric high-velocity air streams. It comprises abstracts of articles selected from Soviet open literature available at the Aerospace Information Divison and the Library of Congress.

**AD-623 006 Div. 9/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY CHEMICAL RESEARCH AND DEVELOPMENT LABS EDGEWOOD ARSENAL MD*
**AN AEROSOL CLOUD: A PHYSIOCOCHEMICAL SYSTEM.**
Technical rept.,
by Albert Pfeiffer. Oct 65, 21p. Rept. no. CRDLR-3323
Task 1C522301A06001

Unclassified report

Descriptors: (*Aerosols, Mechanical properties), Tensile properties, Surface tension, Particles, Molecules, Molecular properties, Force (Mechanics), Physical chemistry

Experiments are described that lead to the suggestion that forces attract aerosol particles to air molecules, whereas thermal motion in the aerosol cloud causes the opposite effect. That tensile strength and surface tension of an aerosol cloud should be the consequences of the attracting forces is proved by the experiments reported. It is concluded that: (1) Forces attract aerosol particles to air molecules. (2) A cloud of fine aerosol possesses tensile strength and surface tension. (Author)

**AD-623 080 Div. 9/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF*
**HYDRODYNAMIC COEFFICIENT CALCULATION USING DOUGLAS POTENTIAL FLOW COMPUTER PROGRAM.**
Research rept. for Apr 64-Jul 65,
by D. M. Nelson. Oct 65, 24p. Rept. no. NOTS-TP-3905
NAVWEPS , 8799

Unclassified report

Descriptors: (*Hydrodynamics, Mathematical analysis), (*Blunt bodies, Fluid dynamic properties), Guided missiles, Programming (Computers), Potential theory, Axially symmetric flow, Velocity, Force (Mechanics), Moments

A new method is presented for calculating the hydrodynamic coefficients of axisymmetric bodies. The method utilizes an extended version of the Douglas potential flow computer program for axisymmetric bodies to calculate the potential and velocity distribution along the body required for the determination of the forces and moment acting on the body. Based on a comparison with experiment limited to one body shape, the method yields values of the hydrodynamic coefficients for blunt- or flat-based bodies which are adequate for most engineering work. (Author)

**AD-622 304 See Fld. 4/2**

**AD-622 316 See Fld. 4/2**

**AD-622 317 See Fld. 4/2**

**AD-622 427 See Fld. 13/10**

**AD-622 539 See Fld. 20/3**

**AD-622 547 See Fld. 20/3**

**AD-622 665 See Fld. 14/2**

**AD-622 690 See Fld. 21/2**

**AD-622 743 See Fld. 21/2**

**AD-622 759 See Fld. 7/4**

**AD-622 762 See Fld. 13/1**



794-372 O-65-7

AD-622 842 See Fld. 19/4

AD-622 969 See Fld. 20/3

AD-623 009 See Fld. 20/3

AD-623 020 See Fld. 20/13

## 20/6. OPTICS

**AD-622 307 Div. 25/4 ,25/3**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**MAGNETO-OPTICAL SCATTERING FROM THE MULTILAYER MAGNETIC AND DIELECTRIC FILMS. PART I. GENERAL THEORY,**
by D. O. Smith. 1 Aug 64, 33p.
Unclassified report

Pub. in Optica Acta v12 n1 p13-45 Jan 1965 (Copies available only to DDC users).

Descriptors: (*Magneto-optic effect, Films), (*Dielectric films, Magneto-optic effect), Optics, Magnetic materials, Electromagnetic wave reflections, Light transmission, Reflection, Scattering, Matrix algebra, Tensor analysis

The study considers the general problem of scattering (reflection and transmission) by thin magnetic films, and includes the effects of adding dielectric films underneath and/or on top of the magnetic film. In Part I, a general theory is given, in terms of 4 x 4 characteristic (transfer) matrices, by means of which scattering by any specific multilayer structure can be solved. The characteristic matrices are calculated for either mu or epsilon taken as gyrotropic tensors. In Part II, applications of the general theory are made in discussing scattering by a magneticmetal substrate, scattering by a magnetic film in an optical standing wave, and measurement of the mu and epsilon tensors.

**AD-622 308 Div. 25/4 ,25/6**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**ELECTRON BEAM PUMPED LASERS OF PBS, PBSE, AND PBTE,**
by C. E. Hurwitz, A. R. Calawa, and R. H. Rediker. 26 Mar 65, 2p.
Unclassified report

Pub. in IEEE Transactions on Quantum Electronics vQE-1 n2 p102-3 May 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Lasers, Diodes (Semiconductor)), (*Lead alloys, Diodes (Semiconductor)), (*Lead compounds, Diodes (Semiconductor)), (*Diodes (Semiconductor), Lasers), Electron beams, Pumping (Electronics), Crystals, Sulfides, Selenium alloys, Tellurium alloys, Optics, Quantum mechanics, Solid state physics

**AD-622 338 Div. 25/4 ,25/2 ,4/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*HUGHES RESEARCH LABS MALIBU CALIF*
**RESEARCH ON RARE EARTH FLUORIDE MATERIALS.**
Interim engineering rept. no. 3, 1 Jun-31 Aug 65,
by C. K. Asawa, D. P. Devor, A. G. Hastings,, M.Robinson, and O. M. Stafsudd. 31 Aug 65, 35p. Contract AF33 615 1999
Unclassified report

Descriptors: (*Lasers, Crystals), (*Rare earth compounds, Fluorides), (*Fluorides, Rare earth compounds), Crystal growth, Single crystals, Lanthanum compounds, Absorption spectrum, Praseodymium compounds, Dysprosium compounds, Cerium compounds, Impurities, Ions, Europium, Terbium, Thulium, Ytterbium

The work reported is directed toward the selection of those high quality rare earth fluoride materials which indicate the most promising host and dopant combinations, with optimum dopant concentrations, for laser applications. Rare earth materials purified by ion exchange indicated a significant improvement in crystal quality. Single crystals of LaF (3) doped with Tb (3+), Tm (3+), Yb (3+), and Ce (3+), in addition to two new hosts - DyF3 and CeF3, were grown for spectroscopic evaluation. DyF3 will be further investigated as a host sensitizer for Pr (3+). Samples of CeF3:Nd (3+) were prepared for laser testing. Crystals of Er (3+) and Er (3+)-Ce (3+)-doped LaF3 were prepared for further study of the quenching of Er (3+) by Ce (3+); this quenching may be accounted for by ion pair interaction. Theoretical considerations of cross relaxation in double-doped systems are discussed. (Author)

**AD-622 398 Div. 25/4 ,4/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*AERONUTRONIC DIV PHILCO CORP NEWPORT BEACH CALIF*
**CHEMICALLY PUMPED LASER SYSTEM.**
Quarterly progress rept. no. 1, 25 Jun 64-31 Jul 65,
by S. Byron, W. Kuby, W. Lawrence, and R. V. Finizie. 31 Aug 65, 31p. Rept. no. U-3259
Contract DA36 034AMC0325T Proj. 1F5 23801D358
Unclassified report

Descriptors: (*Lasers, Pumping (Electronics)), (*Pumping (Electronics), Lasers), (*Energy conversion, Chemical reactions), (*Chemical reactions, Pumping (Electronics)), Pyrotechnics, Shock tubes, Xenon, Shock waves, Optics, Eye, Moneys, Burns

A summary is given of the state of the art in chemical pumping of lasers, the potential performance by various approaches is evaluated, and the specific approach chosen for further development under this contract is described. The program plan for the remainder of the contract is outlined and progress during the past quarter is described. During this quarter an experimental evaluation of various radiation coupling geometries and window materials led to a successful test in which laser action was produced in a ruby by shock heated xenon. A summary is also given of earlier studies by the Bio-Technology Department of the Philco C and E Division, Blue Bell, Pennsylvania, which were directed toward measuring eye damage in monkeys caused by laser irradiation. (Author)

**AD-622 425 Div. 25/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**A CONCEPTUAL MODEL OF THE BACK-SCATTERED FIELD OF LASERS AND THE USE OF THAT MODEL FOR ROTATION DETECTION.**
Master's thesis,
by Edward Phillip Martin, and Robert Ray Sipes. Aug 65, 80p. Rept. no. GE/EE/65-13
Unclassified report

Descriptors: (*Rotation, Measurement), (*Lasers, Electromagnetic wave reflections), Doppler systems, Light, Scattering, Diffraction, Velocity, Detectors, Electromagnetic fields

With the use of a laser, it is possible to measure rotation of a remote object by two techniques: Rotation can be measured by the laser back-scattered field technique and the Doppler spectrum technique. The motion of the back-scattered field was investigated and found to be related to the motion of the target surface. A surface model was developed for the explanation of all experiments performed on the back-scattered field. From preliminary work on the Doppler spectrum, two side results were obtained: (1) a method was discovered to heterodyne the Doppler signal without an external interferometer and (2) a method to measure rotation by the Staas effect (AD-608 087) was demonstrated. Work on the Doppler technique was not completed because of variations in the target speed. (Author)

**AD-622 507 Div. 25/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*OFFICE OF NAVAL RESEARCH WASHINGTON D C*
**LASER PHYSICS CONFERENCE HELD AT THE CONCORD MOTEL, DES PLAINES, ILLINOIS, 22-23 MARCH 1965.**
1965, 96p.
Unclassified report

Also sponsored by Advanced Research Projects Agency, Washington, D. C.

Descriptors: (*Lasers, Symposia), (*Symposia, Lasers), Reports, Energy conversion, Solids, Theory, Refractive index, Ruby, Gases, Masers

The Office of Naval Research sponsored an informal conference on fundamental problems in laser physics at the Concord Motel in Des Plaines, Illinois, on Monday and Tuesday, the 22nd and 23rd of March. The meeting was held primarily for the benefit of the ONR contractors receiving support from the Fundamental Limitations portion of the ONR/ARPA Laser Program. However, others interested in this aspect of the ONR/ARPA Laser Program were also invited to contribute to the meeting. (Author)

**AD-622 558 Div. 25/4 ,25/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*SPRINGFIELD ARMORY MASS*
**A METHOD FOR DETERMINATION OF BROADENED X-RAY DIFFRACTION MAXIMA.**
Technical rept.,
by R. Robert Erard. 17 Sep 65, 49p. Rept. no. SR-TR20-2410
Proj. M1 4 50006 01M1M6
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*X-ray diffraction analysis, Optimization), Crystal lattices, Stresses, Measurement, Diffraction analysis, Tensile properties, Tantalum alloys, Tungsten alloys

An investigation was conducted to develop and evaluate an empirical method of determining the angular location of the K-alpha 1 peak of diffraction lines irrespective of the degree of resolution of the K-alpha 1 doublet. The empirical method is based upon the angular separation and intensity ratio between the two components of the K-alpha doublet. The presently used angular measures of diffraction maxima have precisions of measurement which are tolerable only when the K-alpha doublet is either well resolved or completely merged. The utility and precision of measurement are compared for the determination of lattice parameters, residual stresses, and microstresses by the empirical and customary methods, especially for completely merged doublets, to establish the general applicability of the empirical method. (Author)

**AD-622 576 Div. 25/4 ,25/2 ,14/8**
**CFSTI Prices: HC $2.00 MF $0.50**
*MASSACHUSETTS UNIV AMHERST POLYMER RESEARCH INST*
**THE TRANSMISSION OF LIGHT BY CRYSTAL AGGREGATES BETWEEN POLARIZERS II. TRANSMISSION OF TWO-DIMENSIONAL SPHERULITES.**
Technical rept.,
by Stuart B. Clough, and Richard S. Stein. 26 Aug

65, 50p. Rept. no. TR-75
Contract Nonr335701 ,AT30 1 3003 3 Proj. NR056 378

Unclassified report

See also AD-430 189.

Descriptors: (*Light transmission, Polymers), (*Polymers, Light transmission), Crystals, Polarization

The transmission of light by crystalline polymer films is discussed. For light coherent over the area of an ideal spherulite, the transmittance between crossed polaroids is zero. The intensity measured in the transmission experiment is actually the low-angle light scattering. The equation is presented for the intensity of scattered light integrated out to the maximum angle collected by the detector. Also presented is the correlation function for scattering by a two-dimensional spherulite. (Author)

**AD-622 579 Div. 25/4 ,25/2 ,14/8**
**CFSTI Prices: HC $3.00 MF $0.50**
*MASSACHUSETTS UNIV AMHERST POLYMER RESEARCH INST*
**THE SCATTERING OF LIGHT BY ANISOTROPIC DISCS WITH THEIR PRINCIPAL POLARIZABILITY DIRECTION AT AN ANGLE TO THE RADIUS.**
Technical rept.,
by Richard S. Stein, and Stuart B. Clough. 30 Jun 65, 54p. Rept. no. TR-76
Contract Nonr335701 Proj. NR056 378

Unclassified report

Descriptors: (*Light, Scattering), (*Polymers, Light transmission), Disks, Crystals, Polarization, Trigonometry

Equations are presented for the scattering of light by twodimensional polymer spherulites in which the optic axes of the uniaxial crystals are oriented at an arbitrary angle B to the radii. For the case where the axes lie in the plane of the disc, the scattering patterns is identical to those calculated previously for B = 0 degrees, except that they are rotated through the azimuthal angle by the amount B. Of special interest is the case where the crystals rotate helicoidally about the radii (banded spherulites). The equations predict scattering maxima whose position is related to the period of rotation and the angle B. (Author)

**AD-622 603 Div. 25/4 ,16/4 ,30/3**
*ELECTRON MICROSCOPE SOCIETY OF AMERICA PHILADELPHIA PA*
**ELECTRON MICROSCOPY. VOLUME 2. BIOLOGY,**
by Sydney S. Breese Jr.. Jun 62, 702p. Contract AF AFOSR61 74
AFOSR , 3384 V2

Unclassified report

Proceeding of the International Congress for Electron Microscopy (5th), held in Philadelphia, Pa., 29 Aug-5 Sep 62. Available from Academic Press, New York and London. See also AD-622 612.

Descriptors: (*Electron microscopy, Symposia), (*Symposia, Electron microscopy), (*Biology, Electron microscopy), Nerve cells, Nerve fibers, Nucleic acids, Proteins, Kidneys, Lipoproteins, Viruses, Cells (Biology), Molecular structure, Nerve cells, Reproduction (Physiology), Plants (Botany), Neoplasms, Mitosis, Cytoplasm, Bacteria, Morphology (Biology), Pathology, Membranes (Biology), Microorganisms, Synthesis, Secretion

Contents (biological papers, divided by subject): Biological techniques, motility mechanisms, nerve cells and tissues, nucleic acids and proteins, the nephron, lipoprotein structure, virus fine structure, molecular structure of cell products, synapse and nerve cell, virus reproduction, the plant cell, viruses, cell surface and function, tumor viruses, mitotic structures, cytoplasmic organelles, tumor viruses and neoplastic cell, extracellular matrices, bacterial morphology, pathology, intracellular membrane systems, ultrastructure of microorganisms, experimental pathology, ultrastructure of cellular systems, self-duplicating organisms.

**AD-622 612 Div. 25/4 ,30/3**
*ELECTRON MICROSCOPE SOCIETY OF AMERICA PHILADELPHIA PA*
**ELECTRON MICROSCOPY. VOLUME 1. NON-BIOLOGY,**
by Sydney S. Breese Jr.. Jun 62, 597p. Contract AF AFOSR61 74
AFOSR , 3384 V1

Unclassified report

Proceedings of the International Congress for Electron Microscopy (5th), held in Philadelphia, Pa., 29 Aug-5 Sep 62. Available from Academic Press, New York and London. See also AD-622 603.

Descriptors: (*Electron microscopy, Symposia), (*Symposia, Electron microscopy), Crystal lattice defects, Surface properties, Instrumentation, Design, Radiation damage, Metallurgy metals, Crystal structure, Scattering, Fibers, Polymers, Iron, Films, Metal films, Physical properties, Crystals, Crystal growth, Nucleation, Phase studies, Magnetic properties, Electron diffraction analysis, Electrons, Optics, Electron optics

Contents (subjects under which the papers were presented): General techniques; lattice defects; surface reactions; instrument design; radiation damage; chemical and industrial; metallurgy - nonferrous (dislocations); metallurgy - nonferrous (precipitation); scattering, fibers and polymers; metallurgy - ferrous; thin films; physical techniques; crystals, nucleation and growth; phase transformations (thin filmes); magnetic scattering; electron diffraction; electron optics.

**AD-622 640 Div. 25/4 ,25/6**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**MO-O PROGRESS IN MAGNETO-OPTICAL EFFECTS.**
Reprint,
by B. Lax. 1965, 18p. Contract AF19 604 7344

AFOSR , 65-1171

Unclassified report

Pub. in unidentified journal pub. Paris p253-69. Copies available only to DDC users. Prepared in cooperation with National Magnet Lab., Mass. Inst. of Tech., Cambridge.

Descriptors: (*Magneto-optic effect, Semiconductors), (*Semiconductors, Magneto-optic effect), Cyclotron resonance phenomena, Phase shift, Magnetohydrodynamics, Lasers, Crossed field devices, Infrared phenomena, Impurities, Magnetic fields, Excitation, Tensor analysis

Progress in magneto-optical phenomena in semiconductors and metals has come in two directions, namely, the extension of known techniques to new materials with greater theoretical and experimental sophistication and observation of new phenomena. The situation on the Faraday rotation and Voigt effect is improved but not yet complete. The progress in semimetals has shown the promise of the magneto-reflection technique, which should lead to further exploration of new materials at very high fields. The cross-field phenomenon which is suited for semiconductors provides a more sensitive tool for investigating high gap materials. The emphasis in the future of magneto-optical phenomena is most likely to shift from absorption to emission. The utility of optical excitation by lasers and other strong optical sources will permit high precision measurement of transitions from impurity, interband and intraband levels in the presence of magnetic fields. These will not only provide useful information about the physics of the emission process itself, but will probably also serve as a new source of coherent and incoherent radiation in useful portions of the infrared spectrum. The tunable feature with magnetic fields will be of great value. It is expected that with these new tools and techniques, magnetooptical phenomena will be fruitfully exploited for both basic and applied research from the far infrared to the optical and ultra-violet regions in semiconductors and semimetals.

**AD-622 663 Div. 25/4 ,15/1**
*CALIFORNIA UNIV SAN DIEGO DEPT OF PHYSICS*
**EXISTENCE OF ENERGY GAPS IN THE SPECTRUM OF A ONE-DIMENSIONAL ATOMIC CHAIN.**
Technical rept.,
by Lowell Dworin. 21 Dec 64, 9p. Rept. no. TR-34
Contract Nonr221611 Proj. NR017 630

Unclassified report

Pub. in The Physical Review v138 n4A pA1121-6 May 17 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Atomic energy levels, Atomic spectroscopy), (*Continued fractions, Atomic energy levels), Matrix algebra, Potential theory, Alloys, Functional analysis

The question of the existence of an energy gap in the spectrum of a one-dimensional atomic chain is shown to be related to the question of the convergence of a certain continued fraction whose elements are functions of the elements of the two-by-two cell matrices C to the nth power (E) first introduced by Kramers. The implications of a known theorem (Worpitzky's Theorem) in the study of continued fractions are examined for the case of the chain of delta-function potentials and the binary alloy. (Author)

**AD-622 686 Div. 25/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*SYRACUSE UNIV N Y*
**MOLECULAR BEAM MASER; MASER MATERIAL STUDY; AND ANTIFERROMAGNETIC RESONANCES.**
Rept. for 1 Oct 64-30 Sep 65,
by G. Wessel. Oct 65, 2p. Contract Nonr66918

Unclassified report

Descriptors: (*Masers, Materials), Molecular beams, Antiferromagnetism, Magnetic resonance

A summary is presented of work done on molecular beam masers, maser materials, and antiferromagnetic resonance.

**AD-622 892 Div. 25/4 ,30/3**
*STANFORD RESEARCH INST MENLO PARK CALIF APPLIED PHYSICS LAB*
**MICROMACHINING ELECTRON OPTIC APERTURES IN CLEAR FUSED QUARTZ,**
by Carl E. Blahnik. 31 Mar 65, 5p. Contract Nonr344900 ,Nonr288700

Unclassified report

Pub. in The Review of Scientific Instruments v36 n8 p1203-6 Aug 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Quartz, Machining), (*Drilling machines, Quartz), (*Electron optics, Instrumentation), Electrostatics, Electron lenses

Techniques and apparatus for producing holes as small as 0.05 mm in diameter with optical quality in clear fused quartz disks are described. The realizable tolerances in roundness, concentricity, and surface finish are sufficiently high to yield apertures for an electrostatic electron optical system that requires no axial alignment after initial assembly or repeated high temperature vacuum bakeout. (Author)

**AD-622 949 Div. 25/4 ,25/5**
*LEYDEN STATE UNIV (NETHERLANDS)*
**ON THE THEORY OF THE REFRACTIVE INDEX OF NON-POLAR GASES. I. QUANTUM MECHANICAL PART,**
by P. Mazur, and M. Mandel. 13 Jan 56, 11p.
Contract AF61 514 846

Unclassified report

Pub. in Physics, v22 p289-98 1956. (Copies available only to DDC users).

Descriptors: (*Refractive index, Gases), (*Quantum mecahnics, Perturbation theory), Polarization, Kinetic theory, Electric fields, Dipole moments, Molecules, Tensor analysis

A quantum mechanical calculation is given for the effect of molecular interactions on the polarizability of spherical non polar molecules in a periodic external electric field. The polarizability tensor is obtained from perturbation theory as a power series in the interaction tensor. It is found that the constants C sub 1 and C sub 2 introduced by Jansen and Mazur in the static case, and characterizing the influence of molecular interactions on the polarizability, become now frequency dependent. This frequency dependence is explicitly evaluated for helium at frequencies of the incident wave small compared to the frequencies of the softest absorption line. (Author)

**AD-622 990 Div. 25/4 ,5/6**
**CFSTI Prices: HC $3.00 MF $0.50**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**AN INVESTIGATION OF GERMANIUM DIODES OF VARIOUS GEOMETRIES AS INFRARED MODULATORS.**
Master's thesis,
by Roy Lee Oldham. Aug 65, 52p. Rept. no. GE/EE-65-17

Unclassified report

Descriptors: (*Infrared optical systems, Modulators), (*Modulators, Germanium), (*Diodes (Semiconductor), Infrared phenomena), (*Germanium, Infrared optical materials), Semiconductor devices, Geometric forms, Thermal properties, Absorption, Electrical properties

Four different designs of germanium diodes were investigated to determine their capabilities to be used as infrared modulators. Only the rectangular design is capable of modulating at any usuable frequency. The remaining diodes exhibit low frequency characteristics and are quite susceptible to device operating temperatures. Reasons for these results are presented and discussed. A new design is proposed which incorporates the features of a large injection area and an optical path parallel to the p-n junction. (Author)

**AD-623 000 Div. 25/4 ,25/6 ,25/3 ,8/6 ,+**
**CFSTI Prices: HC $4.00 MF $1.00**
*LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF RESEARCH LABS*
**ELECTRONIC RESEARCH.**
Progress rept. for Apr-Jun 65,
by R. F. Whitmore. Jun 65, 136p. Rept. no. RL-6-75-65-48

Unclassified report

Descriptors: (*Electronics, Scientific research), Plasma physics, Lasers, Wave transmission, Solid state physics, Semiconductors, Magnetic resonance, Underwater, Spectroscopy, Information theory, Automatic indexing, Speech, Crystal structure, Liquids, Films, Superconductivity, Ferromagnetic materials, Tracking, Altimeters

This volume is concerned with the technical progress on fundamental and applied research programs being conducted in the Electronic Sciences Laboratory of the Lockheed Missiles and Space Company. The reports in this volume represent the scope of investigation within the organization, and describe research that is in progress as well as that which is completed. The individual reports are grouped under four major headings (gaseous electronics, solid state electronics, underwater electronics, information sciences) corresponding to the general organization of the Laboratory. Tasks in both fundamental research and applications research are reported. (Author)

**AD-622 394 See Fld. 14/5**

**AD-622 439 See Fld. 4/2**

**AD-622 440 See Fld. 4/2**

**AD-622 446 See Fld. 20/12**

**AD-622 526 See Fld. 4/2**

**AD-622 551 See Fld. 9/2**

**AD-622 563 See Fld. 3/1**

**AD-622 571 See Fld. 14/5**

**AD-622 575 See Fld. 20/14**

**AD-622 738 See Fld. 7/4**

**AD-622 757 See Fld. 20/12**

**AD-622 775 See Fld. 8/6**

**AD-622 808 See Fld. 7/4**

**AD-622 849 See Fld. 4/2**

**AD-622 884 See Fld. 20/12**

**AD-622 890 See Fld. 4/2**

**AD-622 966 See Fld. 7/4**

**AD-622 967 See Fld. 20/3**

**AD-623 033 See Fld. 7/4**

**AD-623 049 See Fld. 14/2**

**AD-623 055 See Fld. 9/4**

**AD-623 064 See Fld. 3/1**

## 20/8. PARTICLE PHYSICS

**AD-622 354 Div. 20/2 ,25/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**MODEL OF THE QUANTUM THEORY OF A FIELD WITH N FIXED FERMIONS,**
by V. A. Gorodtsov. 12 Oct 65, 12p. Rept. no. FTD-TT-65-929
TT , 65-64144

Unclassified report

Unedited rough draft trans. of Moscow Univ. Vestnik. Seriya 3: Fizika, Astronomiya (USSR) v18 n3 p75-80 1963.

Descriptors: (*Fermions, Quantum mechanics), (*Quantum mechanics, Fermions), (*Potential scattering, Fermions), Field theory, Nucleons, Bosons, Mesons, Models (Simulations), Hamiltonian, Operator (Mathematics), S-matrix, USSR

**AD-622 505 Div. 25/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*TUFTS UNIV MEDFORD MASS DEPT OF CHEMISTRY*
**PRESSURE BROADENING OF ROTATIONAL LINES.**
Technical rept.,
by Carl O. Trindle, and Karl H. Illinger. 30 Sep 65, 20p. Contract Nonr49419 Proj. NR014 240

Unclassified report

Descriptors: (*Molecular rotation, Line spectrum), (*Line spectrum, Pressure), Perturbation theory, Fourier analysis, Matrix algebra, Frequency shift

A computational framework was developed which, judiciously applied, can treat the problem of the change in the absorption intensity function with temperature and pressure, given an intermolecular potential. Conversely, experimental results may be analyzed with the goal of calculating the constants in the interaction potential. The present analysis lends itself to a detailed study of the effect of the various approximations entering into line-broadening theory, and may aid in the development of higher-order treatments based upon the assessment of underlying assumptions in current treatments. The further goals of this work include the description of the details of the pressure broadening of microwave spectral lines, for example, frequency shifts, breadths and the first few moments of the intensity function, which will diagnose the asymmetry of the line. The basis of this description is the further analysis of the intensity function derived via a direct calculation of the Heisenberg matrix elements. One may then seek further a simple means of evaluating the constants of the intermolecular potential by the experimental values for the frequency shift and the line-shape parameters. (Author)

**AD-622 584 Div. 20/1 ,15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*CAMBRIDGE LANGUAGE RESEARCH UNIT (ENGLAND) INFORMATION STRUCTURES UNIT*
**THE CALCULATIONS OF CYCLE LENGTHS,**
by Ted Bastin, and Michael Roy. 1 Dec 64, 19p.
Contract AF EOAR64 63
AFOSR 65-1322,

Unclassified report

Descriptors: (*Particle spectra, Determination), (*Algebra, Particle spectra), Data processing systems, Mass spectrum, Sequences, Groups (Mathematics), Elementary particles

A complete set of calculations of cycles of all levels was devised so that comparison with experiment could be made by selection according to special rules from the totality of cycles. The levels of interest are those of increasing descriptive power such as may derive from infinitely proceeding sequences as in the inflow of data into a hierarchial-type information processing system. The algebraic hierarchy generated consists of judgments that can be made about the future development of the sequences expressed in the form of matrix transforms of vectors over the field. Sequences are said to cycle in such a form as V, AV, A squared V . . . A to the jth power V . . . , where the sequence must contain the term A to the kth power V so that A to the kth power V = V. By putting this property of a cycling sequence in terms of the

hierarchial concept, there results: To every vector at level K, there corresponds a cycle at level K minus 1. Calculations were made by their multiplication and enumeration, and a standard form for the matrix and initial vector was used which would generate all possible cycles. The spectrum of cycles has been thought of chiefly in connection with the spectrum of masses of the elementary particles.

**AD-622 618 Div. 20/1 ,20/2**
*STANFORD UNIV CALIF DEPT OF PHYSICS*
**LEPTON SCATTERING AMPLITUDES IN TWO MODEL FIELD THEORIES,**
by H. M. Fried, and G. W. Erickson. 28 Sep 64, 10p. Contract AF49 638 1389
AFOSR , 65-1347
Unclassified report

Pub. in Journal of Mathematical Physics v6 n3 p414-23 Mar 1965 (Copies not available to DDC or Clearinghouse customers). Prepared in cooperation with Courant Inst. of Mathematical Sciences, New York Univ., N. Y.

Descriptors: (*Leptons, Scattering), (*Field theory, Leptons), Model theory, Momentum, Bosons, Green's function, Functional analysis, Nuclear shell models

Two lepton - lepton scattering amplitudes are considered within the context of a no recoil Bloch - Nordsieck model, with emphasis on the singularities in that configuration space variable conjugate to momentum transfer.

**AD-622 619 Div. 20/1**
*STANFORD UNIV CALIF DEPT OF PHYSICS*
**P- AND D-STATE CONTRIBUTIONS TO THE CHARGE FORM FACTORS OF H3 AND HE3,**
by B. F. Gibson, and L. I. Schiff. 30 Nov 64, 7p. Contract AF49 638 1389 Grant ,NSF GP948

AFOSR , 65-1348
Unclassified report

Pub. in The Physical Review v138 n1B pB26-B32 12 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Hydrogen, Nuclear energy levels), (*Helium, Nuclear energy levels), (*Nuclear energy levels, Nuclear scattering), Elastic scattering, Electrons, Nuclear spins, Electrostatics, Special functions, Nuclei

The method of Sachs is used to obtain explicit expressions for the P- and D-state components of the ground-state wave functions of H3 and He3, under the assumption that they have T=1/2 and Jp=1/2+. The effect of a reasonable admixture of these components on the electric charge form factors of the two nuclei is calculated, and it is found that the striking difference between the observed charge form factors cannot be accounted for in this way. It seems most likely that a combination of S'-state and T=3/2-state admixture might provide an explanation of this effect without leading to disagreement with other experimental observations. (Author)

**AD-622 644 Div. 20/2**
*MARYLAND UNIV COLLEGE PARK DEPT OF PHYSICS AND ASTRONOMY*
**PARTICLE-MIXTURE THEORY AND APPARENT CP VIOLATION IN K-MESON DECAY,**
by H. Ezawa, Y. S. Kim, S. Oneda, and J. C. Pati. 18 Jan 65, 4p. Contract AF AFOSR500 64
AFOSR , 65-1345
Unclassified report

Pub. in Physical Review Letters v14 n16 p673-6 Apr 19 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*K mesons, Radioactive decay), (*Meson reactions, Theory), Elementary particles, Mixtures, Models (Simulations), Pions, Antiparticles

A simple model is proposed, based on the idea of particle mixtures, of a mechanism consistant with CP conservation that leads the two-pion-decay mode of the (neutral K, neutral anti-K) system even at 'long' times.

**AD-622 730 Div. 20/2**
*DUKE UNIV DURHAM N C*
**CALCULATION OF ELECTRON SCATTERING FROM PARTIALLY ALIGNED NON-SPHERICAL NUCLEI,**
by L. E. Wright, and D. S. Onley. 31 Jul 64, 10p.

AROD , 3233:12
Unclassified report

Pub. in Nuclear Physics v64 p231-40 1965 (Copies available only to DDC users). Supported in part by the Army Research Office (Durham) and the National Science Foundation.

Descriptors: (*Nuclear scattering, Electrons), (*Electrons, Nuclear scattering), Differential cross section, Nuclear models, Quadrupole moments, Tantalum, Holmium, Nuclear structure

The differential cross section for scattering of highenergy electrons (E = 200 MeV) from partially aligned non-spherical nuclei is calculated. The nuclei are represented by the Bohr-Mottelson model in the strong coupling limit, and the cross section calculated by the distorted wave treatment of electron scattering. Analysis of the (measured) cross section for nonaligned 181Ta gives an intrinsic quadrupole moment of 7 b (comparable with other measurements). The expected dependence of the cross section on the direction and degree of alignment of a similar nucleus (165Ho) is discussed. In particular, for 50% alignment of 165Ho perpendicular to the incident beam, the cross section should display measurable azimuthal asymmetry. (Author)

**AD-622 734 Div. 20/2**
*DUKE UNIV DURHAM N C DEPT OF PHYSICS*
**RESONANCE MODEL FOR ξ+ - K+ PRODUCTION,**
by L. E. Evans, and J. M. Knight. 1 Oct 64, 4p.

AROD , 3233:22
Unclassified report

Pub. in The Physical Review v137 n5B pB1232-5 8 Mar 1965 (Copies not available to DDC or Clearinghouse customers). Supported in part by U. S. Army Research Office (Durham), National Science Foundation, and the Office of Naval Research.

Descriptors: (*Sigma hyperons, Nuclear scattering), (*K mesons, Nuclear scattering), (*Nuclear resonance, Nuclear models), Meson reactions, Pions, Proton reactions, Polarization

A model for the process pion (+) + P to ξ (+)+K (+) is proposed, consisting of hyperon- and K*-exchange diagrams as well as the p3/2 resonance, and a resonance of 1940 MeV, assumed to be 7/2. The resulting fourparameter fit is compared with the cross-section, angular distribution, and polarization data at beam momenta from 1.04 to 1.76 BeV/c. (Author)

**AD-622 739 Div. 20/1**
*EUROPEAN COUNCIL FOR NUCLEAR RESEARCH GENEVA (SWITZERLAND)*
**A REMARK ON MAGNETIC MOMENTS IN THE SU4 SUPERMULTIPLE MODEL,**
by L. C. Biedenharn, J. Nuyts, and N. Straumann. 6 Apr 65, 2p.
AROD , 3233:25
Unclassified report

Pub. in Physics Letters v16 n1 p92-3 May 1 1965 (Copies available only to DDC users).

Descriptors: (*Nuclear magnetic moments, Nuclear models), Nuclear energy levels, Operators (Mathematics), Nucleons

It is shown that the SU4 supermultiplet scheme of Leung and Barut (Y. C. Leung and A. O. Barut, preprint IC/65/16, 6 Feb. 1965, Intern. Centre for Theoretical Physics, Trieste, Italy) lacks the uniqueness which characterizes the magnetic moment predictions for the nucleons in SU6.

**AD-622 772 Div. 20/2**
*HEBREW UNIV JERUSALEM (ISRAEL) DEPT OF PHYSICS*
**ANOMALOUS ISOMER SHIFT RATIOS IN EU151 AND EU153,**
by U. Atzmony, and S. Ofer. 23 Jan 65, 2p. Contract AF EOAR64 24
AFOSR , 65-1177
Unclassified report

Pub. in Physics Letters v14 n4 p284-5 15 Feb 1965 (Copies available only to DDC users).

Descriptors: (*Isomeric transitions, Europium), (*Europium, Isomeric transitions), Nuclear forces, Electric fields, Nuclear energy levels, Europium compounds, Oxides, Sulfates

Anomalous isomer shift rations in Eu151 and Eu153 are discussed. Results are given of recoilless absorption measurements carried out with Eu2O3, EuSO4 and Eu metal absorbers at 20K using the 21.7 keV transition of Eu151 and the 97 KeV and 103 keV transitions of Eu153.

**AD-622 797 Div. 25/7**
**CFSTI Prices: HC $4.00 MF $0.75**
*LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF RESEARCH LABS*
**ABSORPTION COEFFICIENTS OF HEATED AIR: A COMPILATION TO 24,000 K. VOLUME I.**
Final rept. for 1 Apr 64-30 Jul 65,
by D. R. Churchill, B. H. Armstrong, and K. G. Mueller. Oct 65, 116p. Rept. no. 4-77-65-1
Contract AF29 601 6320 Proj. 5710
AFWL , TR-65-132 V1
Unclassified report

Descriptors: (*Air, Absorption spectrum), (*Absorption spectrum, High-temperature research), Tables, Line spectrum, Atomic energy levels, Differential equations, Heat, Absorption, Density

An extensive tabulation of absorption coefficients of heated air has been carried out with the aid of several large digital computer programs. These tables supersede the previous ones computed at Lockheed by Meyerott, Sokoloff, and Nicholls in 1959. Tables are presented for temperatures at every 1000 K between 1000 K and 24,000 K and for eight densities between ten times normal atmospheric to 0.000001 times normal. Absorption coefficients are individually listed for each of 14 contributing absorbers. The photon energy range is 0.6-10.7 eV with a partition interval of 0.1 eV. (Author)

**AD-622 858 Div. 20/1 ,20/3**
*INSTITUTO DE INVESTIGACION AERONAUTICA Y ESPACIAL BUENOS AIRES (ARGENTINA) LABORATORIO DE RADIACIONES*
**STUDIES ON THE PROPERTIES AND SYSTEMATICS OF NUCLEAR STRUCTURE EFFECTS.**
Annual technical rept., for Mar 64-Jan 65,
by Horacio E. Bosch. Jan 65, 61p. Contract DA ARO49 092 64G35 Proj. 2001050B700
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Nuclear structure, Even-even nuclei), (*Radiochemistry, Nuclear properties), Nuclear models, Niobium, Molybdenum, Solvent extraction, Ammonium compounds, Halides, Decay schemes, Nuclear energy levels, Neon, Tin

Preprints are given of articles on: Models related to even-even nuclei systematics; Separation of Niobium and Molybdenum by solvent extraction with quaternary ammonium halides; Fast procedure for isolating carrierfree niobium from molybdenum; Determination of the 0.400 MeV-transition K-conversion coefficient in the decay of Pb203 using a solid state detector. Abstracts are given of articles on: Phenomenological and microscopic analysis of properties of even-even nuclei; Decay schemes and radiochemical studies.

**AD-622 900 Div. 20/2**
*IMPERIAL COLL OF SCIENCE AND TECH LONDON (ENGLAND)*
**U (12) AND VECTOR MESON DECAYS,**
by F. Hussain. 4 Feb 65, 2p. Contract AF EOAR62 87
AFOSR , 65-1349

Unclassified report

Pub. in Physics Letters v15 n1 p78-9 Mar 1 1965 (Copies available only to DDC users).

Descriptors: (*Mesons, Decay schemes), (*Groups (Mathematics), Meson reactions), Vector analysis

**AD-622 915 Div. 20/2**
*TORINO UNIV (ITALY) ISTITUTO DI FISICA*
**ANGULAR CORRELATIONS IN NUCLEAR DIRECT ELECTRODISINTEGRATION,**
by E. Napolitano, and G. Ponzano. 20 Jul 64, 6p. Contract AF EOAR62 101
AFOSR , 65-1351

Unclassified report

Pub. in Il Nuovo Cimento v35 (SX) p279-83 Jan 1 1965 (Copies available only to DDC users.

Descriptors: (*Inelastic scattering, Electrons), (*Nuclear shell models, Nuclear reactions), Decay schemes, Nuclear structure, Photonuclear reactions, Italy

The single-particle shell model of the nucleus is used to calculate the angular correlations between the inelastically scattered electrons, and the nucleons emitted via the direct electromagnetic interaction induced by the impinging electrons. General results have been established; they are shortly summarized in this note. (Author)

**AD-622 918 Div. 20/2**
*DUKE UNIV DURHAM N C DEPT OF PHYSICS*
**SHELL-MODEL DESCRIPTION OF THE EXCITATION OF HEAVY NUCLEI BY INELASTIC ELECTRON SCATTERING,**
by J. T. Reynolds, and D. S. Onley. 3 Aug 64, 16p.
AROD , 3233:11

Unclassified report

Pub. in Nuclear Physics v66 p1-16 1965 (Copies available only to DDC users). Supported in part by Army Research Office (Durham) and National Science Foundation.

Descriptors: (*Inelastic scattering, Electrons), (*Nuclear shell models, Excitation), Nuclear scattering, Phonons, Nuclei, Nickel, Nuclear forces

The nuclear shell model with residual pairing and longrange forces is used to calculate angular distributions of inelastically scattered electrons exciting one-phonon E2, E3 and E4 transitions in spherical nuclei. The electron wave functions are treated by the distortedwave method. Treatment of two-phonon excitations by the direct (single excitation) process is also presented. Numerical results for scattering from Ni58 and Ni60 show good agreement with experimental cross sections for one-phonon excitations but not for two-phonon states. (Author)

**AD-622 919 Div. 25/7 ,25/6**
*ROCHESTER UNIV N Y DEPT OF PHYSICS AND ASTRONOMY*
**BAND STRUCTURE AND ELECTRONIC PROPERTIES OF AGCl AND AGBR,**
by R. S. Knox, and W. Beall Fowlers. 11 Sep 64, 9p. Contract AF AFOSR62 145 ,AF AFOSR611 64
AFOSR , 65-1189

Unclassified report

Pub. in The Physical Review v137 n4A pA1217-25 Feb 15 1965 (Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Silver compounds, Halides), (*Halides, Silver compounds), (*Band spectrum, Silver compounds), Bromides, Chlorides, Quantum mechanics, Molecular spectroscopy, Electron transitions, Molecular structure, Chemical bonds, Atomic energy levels

A theoretical study of the electronic properties of silver chloride and bromide is reported. The valence bands of AgCl have been calculated by the tight-binding method, using a screened free-electron exchange potential. It is found that the highest valence band has several maxima at points other than gamma, while the results of experiment and other preliminary calculations indicate that the lowest conduction band is simple, with a minimum at gamma. The spin-orbit splitting in the highest valence band for the state L3' has been computed and is found to be less than 0.05 eV. It is shown that Brown's lowtemperature data on optical absorption in the long-wavelength tail can be explained by our band structure and Cole's experimental phonon dispersion curves. Using the AgCl calculation as a starting point, we have analyzed the available optical data on both AgCl and AgBr along lines suggested by the work of Phillips in the alkali halides and rare gases. For both crystals, conductionband structures are proposed which appear to explain the gross features of the data. (Author)

**AD-622 954 Div. 25/7 ,25/6**
*CASE INST OF TECH CLEVELAND OHIO*
**RIGID BAND BEHAVIOUR IN DILUTE ALUMINIUM ALLOYS,**
by J. P. G. Shepherd, D. Roberts, and W. L. Gordon. 16 Jul 65, 2p.
AROD , 4987:1

Unclassified report

Pub. in Physical Letters v18 n2 p103-4 Aug 15 1965 (Copies available only to DDC users).

Descriptors: (*Aluminium alloys, Atomic energy levels), (*Band spectrum, Aluminium alloys), Zinc alloys, Silicon alloys, Specific heat, Magnetic properties, Magnetic fields, Crystals, Electron transitions, Perturbation theory

The De Haas-Van Alphen effect in Al based alloys were studied. Measurements on dilute alloys of Zn and Si in Al are reported. The results are discussed in terms of the 3rd zone Fermi surface of Al proposed by Ashcroft and the rigid band theory of alloys with which they show generally good agreement. In contrast to these results, recent measurements of the steady magnetic susceptibility and low temperature specific heat of more concentrated Al alloys by Blythe et al. have shown major departures from the predictions of the rigid band model. Attention is drawn to this striking difference without proposing a solution.

**AD-622 303 See Fld. 18/4**

**AD-622 329 See Fld. 18/4**

**AD-622 343 See Fld. 7/4**

**AD-622 389 See Fld. 3/1**

**AD-622 567 See Fld. 20/4**

**AD-622 573 See Fld. 8/11**

**AD-622 592 See Fld. 20/12**

**AD-622 620 See Fld. 7/4**

**AD-622 645 See Fld. 4/2**

**AD-622 704 See Fld. 14/2**

**AD-622 735 See Fld. 4/2**

**AD-622 845 See Fld. 20/2**

**AD-623 030 See Fld. 20/12**

## 20/10. QUANTUM THEORY

**AD-622 517 Div. 25/5 ,8/7**
**CFSTI Prices: HC $4.00 MF $0.75**
*SYRACUSE UNIV N Y DEPT OF ELECTRICAL ENGINEERING*
**A PROPOSED MEASURE FOR THE INFORMATION CONTENT IN QUANTUM FIELDS.**
Technical rept.,
by Daniel Schutzer. 17 Aug 65, 104p. Rept. no. TR-8 ,EE-494-658-T-8
Contract Nonr66910

Unclassified report

Descriptors: (*Quantum mechanics, Field theory), (*Communication theory, Quantum mechanics), Elementary particles, Electromagnetic fields, Vacuum, Signals

Under the present formulation of Quantum Mechanics, there exists a vacuum energy. The function describing an elementary particle, the field function, has random fluctuations superimposed upon it. An existence information measure is proposed to describe the information contained in a particle field. Existence information is the uncertainty in making the decision that a particle field exists, in light of the vacuum fluctuation effect. Relationships between the existence information and basic intuitive ideas of information theory are brought out. Connections are shown between Shannon's formulation of information theory, Wigner's skew information measure, and the proposed, existence information. Plausibility arguments for the appropriateness of existence information as the representation of field information are presented. Interactions between particles, and the self-interference of a particle is discussed and related to distinguishability, choice, correlation and existence information. Electromagnetic scattering is discussed and is associated with the coherence between the two particles vacuum fluctuations. Existence information is calculated and studied as a function of measurements and interactions. The total existence information content of an isolated system, (possibly interacting internally) is found to be independent of time. (Author)

**AD-622 736 Div. 25/5 ,15/1**
*EUROPEAN COUNCIL FOR NUCLEAR RESEARCH GENEVA (SWITZERLAND)*
**THE GENERALIZATION OF THE WIGNER-RACAH ANGULAR MOMENTUM CALCULUS, II,**
by L. C. Biedenharn. 8 Jan 65, 2p.
AROD , 3233:26

Unclassified report

Pub. in Physics Letters v14 n3 p254-5 Feb 1 1965 (Copies available only to DDC users).

Descriptors: (*Momentum, Operators (Mathematics)), (*Operators (Mathematics), Momentum), Perturbation theory, Groups (Mathematics), Quantum mechanics, Calculus of variations, Algebra

The very great importance in all branches of quantum physics of the Wigner-Racah angular momentum calculus has led to many attempts to generalize this structure from the two-dimensional unimodular unitary ('angular momentum') group, where it originated, to the general semi-simple compact Lie group. A solution to the various problems connected with this generalization, in particular the problem of simple reducibility, has been sketched in an earlier note (AD-613 412), and the detailed proofs of the results stated there have been obtained. The purpose of the present note is to show that this generalization is a canonical resolution of the multiplicity problem, explicitly for all SU sub n and thereby implicity for all other groups in question by imbedding in SU sub n. The method is especially interesting in that it demonstrates a new significance for the Racah coefficients, and shows the existence of intriguing continuum limit properties for the generalized Racah and Wigner coefficients. Proofs of the assertions to be made below will be given elsewhere, but the structure of the results to be presented is rather elegant and should be easily accessible.

**AD-622 354** **See Fld. 20/8**

**AD-622 415** **See Fld. 3/1**

**AD-622 626** **See Fld. 20/4**

**AD-622 662** **See Fld. 20/2**

**AD-622 668** **See Fld. 12/1**

**AD-622 801** **See Fld. 20/13**

**AD-622 832** **See Fld. 14/2**

**AD-622 848** **See Fld. 20/4**

**AD-622 870** **See Fld. 14/2**

**AD-622 886** **See Fld. 8/14**

**AD-622 887** **See Fld. 20/13**

**AD-622 914** **See Fld. 12/1**

**AD-622 949** **See Fld. 20/6**

## 20/12. SOLID STATE PHYSICS

**AD-622 309 Div. 25/6 ,8/2**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**S-BAND GAAS GUNN EFFECT OSCILLATORS,**
by T. M. Quist, and A. G. Foyt. 28 Jan 65, 2p.

Unclassified report

Pub. in Proceedings of the IEEE Correspondence p303-4 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gallium alloys, Arsenic alloys), (*Arsenic alloys, Gallium alloys), (*Microwave oscillators, S band), Intermetallic compounds, Radiofrequency power, Electromagnetic properties, Semiconductor devices

2.5 watts of peak power was obtained from GaAs Gunn effect oscillators (1)- (5) at room temperature at about 3Gc/s with a power efficiency of 7 per cent. The devices were fabricated from n-type GaAs which had a room temperature resistivity about 0.75 ohm-cm and mobility of 5500 sq cm/Vs. 'Ohmic' contacts were made to (100)-oriented chips of chemicallypolished GaAs by alloying one surface to a disc of Sn-clad Mo and alloying a Sn sphere into the other surface. The alloying was done in a hydrogen atmosphere at 360C. The devices have been assembled in a small varactor package. All devices investigated were less than 40-microns thick. The low field resistances of the devices have shown variations, and only those samples whose resistances were consistent with the bulk resistivity have made good oscillators. These devices have shown consistent results as to frequency of oscillation, threshold voltage, and efficiency, while devices having a resistance other than the expected resistance have shown current instabilities but no coherence and very small amounts of microwave power.

**AD-622 322 Div. 25/6 ,17/7**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**RESISTIVITIES AND TRANSFORMATION RATES OF HIGH-PRESSURE INSB-BETA SN ALLOYS,**
by M. D. Banus, Lynne B. Farrell, and A. J. Strauss. 23 Oct 64, 3p.

Unclassified report

Pub. in Journal of Applied Physics v36 n7 p2186-8 Jul 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Alloys, Solid state physics), (*Indium alloys, Tin alloys), Cryogenics, Antimony alloys, Resistance (Electrical), Transformations, Temperature, Time, Solid solutions, High-pressure research

At atmospheric pressure, alloys of high-pressure InSb sub pi and beta Sn are retained indefinitely as metastable phases at 77K but are transformed into stable two-phase mixtures of low-pressure InSb sub pi and Sn at sufficiently high temperatures. The resistivity of these alloys at 77K has been measured as a function of composition, and the temperature and time dependence of resistivity up to 300K has been determined for samples containing up to 60 at.% Sn. The data show that at any temperature the rate of transformation decreases monotonically with increasing Sn content, and, therefore, that solid solutions of InSb sub pi and Sn are formed up to at least 60 at.% Sn. The data are thus consistent with complete solid solution in the InSb sub piSn system, as previously concluded on the basis of superconductivity data. (Author)

**AD-622 369 Div. 25/6 ,14/2 ,17/4**
**CFSTI Prices: HC $4.00 MF $0.75**
*NAVAL RESEARCH LAB WASHINGTON D C*
**PREPARATION AND CHARACTERIZATION OF ULTRAPURE SOLIDS,**
Annual rept. for 1 Jul 64-30 Jun 65,
by J. H. Schulman, G. T. Rado, M. R. Achter, and A. I. Schindler. Aug 65, 110p. Rept. no. nrl memo. rept. 1640
Proj. arpa order 418

Unclassified report

See also AD-443 666.

Descriptors: (*Single crystals, Preparation), (*Refractory metals, Preparation), (*Magnetic materials, Preparation), Crystal growth, Potassium compounds, Bromides, Purification, Niobium, Crystal structure, Grain boundaries, Porosity, Diffusion, Transition elements, Intermetallic compounds, Gallium compounds, Ferrates, Aluminum compounds, Oxides

The research program on the preparation of ultrapure alkali halide single crystals incorporates three interrelated steps: purification, single crystal growth, and characterization and analysis. In the preparation and study of highly perfect specimens of refractory metals, accomplishments were made in four areas: (a) procedures were developed for the growth of single crystals of niobium by the strain-anneal technique and for the study of their structure by x-ray and metallographic methods, (b) measurements were made of the rate of sintering of porosity in the grain boundaries of niobium bicrystals, (c) bicrystals were prepared for the study of the interfacial energy as a function of misorientation, (d) techniques were developed for the measurement of intergranular diffusion in the bicrystals of niobium. Studies on transition metal and intermetallic compound single crystals were concentrated in four main areas: (a) crystal growth kinetics, (b) transition metal crystal preparation, (c) crystal perfection, and (d) purity evaluation.

**AD-622 381 · Div. 25/6 ,7/5 ,17/5 ,17/7**
**CFSTI Prices: HC $3.00 MF $0.75**
*WESTINGHOUSE RESEARCH LABS PITTSBURGH PA*
**BASIC STUDIES ON THERMOELECTRIC MATERIALS.**
Quarterly rept. no. 13, 28 Sep-27 Dec 64.
Jan 65, 67p. Contract NObs90444 Proj. SR007 12 01 Task 801

Unclassified report

See also AD-622 382.

Descriptors: (*Semiconductors, Thermoelectricity), (*Alloys, Thermoelectricity), (*Thermoelectricity, Materials), Platinum alloys, Antimony alloys, Germanium alloys, Tellurium alloys, Iron alloys, Arsenic alloys, Osium alloys, Manganese alloys, Rhodium alloys, Sulfides, Ruthenium alloys, Iron compounds, Selenium alloys, Cobalt compounds, Arsenic compounds, Platinum compounds, Phosphorus compounds, Bismuth alloys, Cobalt alloys, Nickel compounds, Antimony compounds, Gold alloys, Electrical properties, Single crystals, Transport properties

Work was performed on a number of materials of thermoelectric interest. Although some of the work involves a study of a large number of compounds, the major interest in all work has been a better understanding of the properties of materials and the interrelations between the transport properties of interest in thermoelectric applications and the fundamental properties of the material such as the valence electron density and the crystal structure. Materials which have been studied are PtSb, GeTe, and a wide class of materials having pyrite or marcasite structures.

**AD-622 382 Div. 25/6 ,7/5 ,17/7 ,25/8**
**CFSTI Prices: HC $3.00 MF $0.75**
*WESTINGHOUSE RESEARCH LABS PITTSBURGH PA*
**BASIC STUDIES ON THERMOELECTRIC MATERIALS.**
Quarterly rept. no. 14, 28 Dec 64-28 Mar 65.
Apr 65, 77p. Contract NObs90444 Proj. SR007 12 01 Task 801

Unclassified report

See also AD-622-381.

Descriptors: (*Thermoelectricity, Materials), (*Semiconductors, Thermoelectricity), Selenium, Platinum alloys, Antimony alloys, Germanium alloys, Tellurium alloys, Thermal conductivity, Thallium alloys, Bismuth alloys, Transport properties, Cooling, Mechanical properties, Electrical properties, Theory, Anisotropy, Refrigerating system

Platinum antimonide was investigated with emphasis on measurements of thermal conductivity. A study of the GeTeTlBiTe2 system contributed to the understanding of the mechanical properties of GeTe and enabled the production of materials with a high figure of merit and better mechanical properties. Attempts were made to measure the anisotropy of the thermal conductivity of selenium, but no results have been obtained so far. The conditions under which Ettingshausen and magnetically enhanced Peltier effect devices have sufficiently high performance to be useful were investigated. A general review of the theory of thermal conductivity in solids was written.

**AD-622 393 Div. 25/6 ,17/7 ,26/1**
**CFSTI Prices: HC $4.00 MF $0.75**
*TYCO LABS INC WALTHAM MASS*
**POWER-DENSE THERMOELECTRIC MODULE. PHASE IV: SOLIDIFICATION OF THERMOELECTRIC MATERIALS UNDER THE INFLUENCE OF ULTRASONIC AGITATION.**
Final rept.,
by Martin Weinstein. May 64, 108p. Contract Nobs86015 Proj. SR0071201

Unclassified report

See also AD-431 558.

Descriptors: (*Semiconductors, Thermoelectricity), (*Thermoelectricity, Materials), (*Ultrasonic radiation, Casting), Intermetallic compounds, Lead alloys, Tellerium alloys, Tin alloys, Bismuth alloys, Selenium alloys, Antimony alloys, Germium alloys, Silicon alloys, Solid solutions, Microstructure, Electrical properties, Ductility, Compressive properties, Grain structures (Metallurgy), Mechanical properties

A technique is described for preparing fine-grained PbTe, PbTe-SnTe, Bi2Te3, Bi2Te3-Bi2Se3, and Bi2Te3-Sb2Te3 by ultrasonic agitation of a solidifying melt. Material prepared by this technique is dense and chemically homogeneous. The thermoelectric efficiency factors of ultrasonically prepared PbTe and PbTe-SnTe compare very favorably with that of material prepared by other techniques. The ultrasonically prepared Bi2Te3 and Bi2Te3 alloys normally possess lower thermoelectric-efficiency factors than material prepared by directional solidification. The lower thermoelectric efficiency of the (UA) material is associated with the anisotropic behavior of the electrical properties in Bi2Te3 layerlike structures. Comparison of compressive-flow curves for PbTe and SnTe-PbTe solid solutions prepared by various techniques shows that the ultrasonically prepared material has greatly superior ductility and strength. In the Bi2Te3 and Bi2Te3 alloy systems, the ultrasonic material shows higher compressive strengths than material prepared by directional solidification. The ductility of the Bi2Te3 and Bi2Te3 alloys prepared by ultrasonic agitation is essentially the same as that of material prepared by directional solidification. Preliminary results are reported on the Ge-Si solid solution system.

**AD-622 397 Div. 25/6 ,14/6 ,4/2**
*NEW YORK UNIV N Y RADIATION AND SOLID STATE LAB*
**LUMINESCENCE, INFRARED RESPONSE AND ENERGY STORAGE OF VARIOUS LUMINESCENT MATERIALS IN RELATION TO PREPARATIVE METHODS AND CONDITIONS.**
Rept. no. 1, 31 Jan 63-30 Sep 64,
by Hartmut P. Kallmann. Nov 64, 62p. Contract DA ARO D31 124G420 Proj. AROD 3987p
AROD , 3987.1

Unclassified report

DDC reference users only.

Descriptors: (*Phosphorescent materials, Physical properties), (*Luminescence, Materials), (*Infrared optical materials, Phosphorescent materials), Chemical properties, Synthesis (Chemistry), Single crystals, Crystal growth, Zinc compounds, Cadmium compounds, Sulfides, Impurities, Silver, Copper, Gold, Chromium, Aluminum, Chlorine, Photoconductivity, Paramagnetic resonance, Thermal conductivity, Photoelectric effect, Electroluminescence

The investigation of the physical properties of phosphors, particularly with respect to infrared response and the relationship to their chemical composition and the conditions under which they are synthesized, was continued. ZnCdS phosphors, with various activators (Ag, Cu, Au, Cr) and coactivators (Al, Cl), were synthesized and single CdS crystals were grown. The following properties of the phosphors were investigated: Fluorescence efficiency, photoconductivity, paramagnetic resonance, its rise and decay, energy storage, thermoluminescence, thermoconductivity, influence of infrared light of various wavelengths on luminescence, photoconductivity and paramagnetic resonance, electro-luminescence and photovoltaic response. General features of the synthesis of these phosphors are described and a general summary of their physical properties is given. The dependence of luminescence and thermoluminescence on infrared irradiation is treated in detail for Cr-activated phosphors. The influence of infrared on various other phosphors is also presented. (Author)

**AD-622 432 Div. 25/6 ,31/4 ,13/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*DAVID TAYLOR MODEL BASIN WASHINGTON D C STRUCTURAL MECHANICS LAB*
**THE INELASTIC BUCKLING OF MACHINED HIGH STRENGTH STEEL HEMISPHERES WITH IDEAL BOUNDARIES.**
Final rept.,
by Kanehiro Nishida. Sep 65, 20p. Proj. S F013 03 02 Task 2020
DTMB , 2090

Unclassified report

Descriptors: (*Buckling (Mechanics), Hemispherical shells), (*Hemispherical shells, Buckling (Mechanics)), (*Steel, Hemispherical shells), Stiffened cylinders, Maching, Hydrostatic pressure, Model tests, Experimental data, Failure (Mechanics), Submarine hulls

Five structural models consisting of hemispheres bounded by ring-stiffened cylinders designed to provide membrane edge conditions were hydrostatically tested. The models were machined from high strength steel with yield strength of 130,000 psi and were designed to collapse by plastic instability. The experimental collapse pressures obtained are in good agreement with the pressures predicted by the Model Basin empirical inelastic buckling equation. The maximum difference obtained was 6 percent. (Author)

**AD-622 446 Div. 25/6 ,25/4**
**CFSTI Prices: HC $4.00 MF $0.75**
*LINCOLN LAB MASS INST OF TECH LEXINGTON*
**SOLID STATE RESEARCH, 1965.**
Quarterly progress rept. for 1 Jan-30 Apr 65,
by Harry C. Gatos. 22 Sep 65, 109p. Contract AF19 628 500 Proj. 649L
ESD , TDR-65-71

Unclassified report

Descriptors: (*Solid state physics, Scientific research), Electronics laboratories, Lasers, Semiconductor devices, Pumping (Electronics), Magnetic resonance, Magnetic properties, Materials, Luminescence, Plasma physics, High-pressure research, Crystal growth, Phase studies, Transport properties, Bibliographies

This report covers in detail the solid state research work at Lincoln Laboratory for the period 1 January 1965 through 30 April 1965. The topics covered are Solid State Device Research, Laser Research, Materials Research, and Solid State Physics.

**AD-622 480 Div. 25/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**HIGH PRECISION CALCULATIONS OF PARAMETERS FOR FREQUENCIES AND MODE SHAPES OF UNIFORM BEAMS,**
by C. S. Colonna. 1 Jul 64, 28p. Rept. no. CF-3093
Contract NOw62 0604c

Unclassified report

Descriptors: (*Beams (Structural), Vibration), Frequency, Harmonic analysis, Boundary value problems, Transcendental functions

Expressions are summarized for the normal modes of vibration of ten uniform beams and numerical results given of double precision calculations for the frequencies, mode shape coefficients and related parameters in tabular form. General properties of the beam equation, boundary conditions, and modes of vibration are discussed. The ten beam problems are related to three standard problems. The transcendental equations determining the normal modes and frequencies are given for each type of beam. The method of calculating the frequencies to a high degree of accuracy is stated briefly. The numerical data is tabulated and the formulas discussed earlier are summarized.

**AD-622 482 Div. 25/6 ,15/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**BOUNDS TO EIGENVALUES OF RHOMBICAL MEMBRANES,**
by James T. Stadter. 12 May 64, 43p. Rept. no. CF-3084
Contract NOw62 0604c

Unclassified report

Descriptors: (*Membranes, Vibration), (*Boundary value problems, Membranes), Elasticity, Mapping (Transformations), Matrix algebra, Operators (Mathematics)

Upper and lower bounds to eigenvalues are obtained for vibrating rhombical membranes. Two specific problems are treated: the membrane which has all edges fixed and the membrane which has two opposite edges fixed, the other two edges free. These problems have been studied as part of a systematic program for the development of rigorous methods for the estimation of frequencies of elastic structures. The techniques used are applicable to a substantial class of plate problems of interest in guided missile technology, but, since the analysis for membranes is in general easier than for plates, the problems treated here form an ideal vehicle for the acquisition of experience in applying the methods (actually, the fixed membrane problem considered here is essentially identical with the problem for simply supported plates. The method used consists of the following steps: (1) map the rhombus to the unit square using an affine transformation; (2) obtain the quadratic form, J, of the transformed membrane operator; (3) introduce two quadratic forms, one smaller than J, one larger, for which the corresponding eigenvalue problems can be solved; and (4) apply the B*B method to obtain the desired bounds.

**AD-622 490 Div. 25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*

**LONG PERIOD GRAVITY GRADIENT DAMPING,**
by B. E. Tossman. 2 Jan 64, 20p. Rept. no. CF-3060
Contract NOw62 0604c

Unclassified report

Descriptors: (*Damping, Springs), (*Gravity, Damping), Internal friction, Creep, Elasticity, Deformation, Loading (Mechanics)

Preliminary findings are reported on the long period damping capacity of damper springs. The basic problem confronting this long period investigation has been the fact that the periods of interest are in the order of one hour and greater and therefore tend to preclude direct measurement experiments. Methods are presented whereby the damping capacity can be predetermined plus the results of recent long period experiments. It is shown that since internal friction is a manifestation of material anelasticity, Boltzmann's Superposition Principle can be used to develop a correlation between internal friction and anelastic creep. By simply measuring the fundamental anelastic properties of each damper spring, it therefore becomes possible to generate complete damping versus frequency curves.

**AD-622 495 Div. 25/6**
**CFSTI Prices: HC $3.00 MF $0.75**
*DEFENSE RESEARCH LAB UNIV OF TEXAS AUSTIN*
**EXPERIMENTAL DETERMINATION OF FREQUENCIES AND MODE SHAPES OF CANTILEVER AND HUB-PIN PLATES.**
Technical rept.,
by R. R. Craig, H. J. Plass,Jr., and D. A. Caughfield. Jun 64, 63p. Rept. no. DRL-518 ,CR-13
Contract NOrd16498 Task UTX2

Unclassified report

Descriptors: (*Metal plates, Vibration), Cantilever beams, Frequency, Deflection, Graphics

The report contains experimental data on the frequencies and mode shapes of vibrating plates. Data for the following plates are presented: a square cantilever plate; skew cantilever plates having sweep-back angles of 15, 30, 45, and 60 degrees; triangular cantilever plates having aspect ratios of 2 (45 degree triangle), 3.3, and 4; a square hubpin plate; and a 45 degree triangular hub-pin plate. Electrical and mechanical improvements to the system are described. (Author)

**AD-622 502 Div. 25/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*CALIFORNIA INST OF TECH PASADENA DIV OF ENGINEERING AND APPLIED SCIENCE*
**MINIMUM ENERGY CHARACTERIZATIONS OF SAINTVENANT'S SOLUTION TO THE RELAXED SAINT-VENANT PROBLEM.**
Technical rept.,
by Eli Sternberg, and James K. Knowles. Aug 65, 37p. Rept. no. TR-3
Contract Nonr22058 Proj. NR064 431

Unclassified report

Descriptors: (*Elasticity, Strain (Mechanics)), (*Deformation, Cylindrical bodies), Stresses, Prismatic bodies, Energy, Statics, Boundary value problems

This investigation aims at minimum strain-energy characterizations of Saint-Venant's solutions to the relaxed problem of extension, bending, torsion, and flexure of prismatic and cylindrical bodies. The results obtained show that Saint-Venant's solutions for the cases of extension, bending, and torsion are uniquely distinguished-among all solutions to the corresponding relaxed problem meeting certain natural side conditions--by the fact that they render the total strain energy an absolute minimum. In contrast, the classical flexure solution was found to be no longer 'optimal' in the foregoing sense and the determination of the actual optimal flexure solution has been reduced to the solution of a mixed-mixed boundaryvalue problem in elastostatics. (Author)

**AD-622 508 Div. 25/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*ILLINOIS INST OF TECH CHICAGO DEPT OF MECHANICS*
**PLASTIC ANALYSIS OF RIB-REINFORCED CYLINDRICAL SHELLS,**
by Andre Biron, and Antoni Sawczuk. Jul 65, 26p. Rept. no. DOMIIT-1-29
Contract Nonr140604 Proj. NR064 429

Unclassified report

Descriptors: (*Cylindrical bodies, Structural shells), (*Stiffened cylinders, Structural shells), (*Structural shells, Stiffened cylinders), Reinforcing materials, Plastics, Strain (Mechanics), Loading (Mechanics), Stresses, Surface properties, Anisotropy, Nonlinear differential equations

Using the strain mapping method for the Tresca yield condition, the yield surface is derived for a cylindrical shell with a wall reinforced by longitudinal ribs on one side. Results are given for the case where the axial load is zero. As a sample problem utilizing this surface and an appropriate method of solution of non-linear equations, the exact plastic solution of a cantilever shell under constant pressure is obtained. (Author)

**AD-622 525 Div. 25/6 ,15/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*NORTH CAROLINA STATE UNIV RALEIGH SCHOOL OF PHYSICAL SCIENCES AND APPLIED MATHEMATICS*
**A BOUSSINESQ PROBLEM FOR A FINITE CYLINDER,**
by David B. Teague. May 65, 89p. Rept. no. PSR-244
Contract AF AFOSR444 64
AFOSR , 65-1328

Unclassified report

Descriptors: (*Boundary valve problems, Cylindrical bodies), (*Cylindrical bodies, Boundary valve problems), Mechanical properties, Loading (Mechanics), Integral equations

A Boussinesq problem for a finite clamped cylinder is redued to a Fredholm integral equation of the second kind with a symmetric kernel using the method of SneddonSrivastav. A simple approximate solution for the integral equation is obtained. This solution is accurate to within 3% provided the ratio of the radius of contact of the punch to the radius of the cylinder is less than one-half. Formulas are derived for the normal stress and displacement components, total force on the punch, and penetration of the tip of the punch as quadratures of the solution of the integral equation which are accurate to within 1% provided the ratio of length to radius of the cylinder is greater than unity. The accuracy of all final results is within 4% because of the accuracy of the solution of the integral equation. If the ratio of radius of contact of the punch to the radius of the cylinder is 0.1 or less, the results differ only slightly from the known solutions for the infinite half space. (Author)

**AD-622 534 Div. 25/6**
*TOWNE SCHOOL OF CIVIL AND MECHANICAL ENGINEERING UNIV OF PENNSYLVANIA PHILADELPHIA*
**ELASTICITY OF RANDOM MEDIA,**
by Zvi Hashin. 1965, 26p. Contract DA31 124ARO D194

Unclassified report

Pub. in Transactions of the Society or Rheology v9 n1 p381-406 1965 (Copies available only to DDC users).

Descriptors: (*Elasticity, Mathematical analysis), Mathematical prediction, Crystals, Composite materials, Reinforcing materials, Fibers, Creep, Stresses, Strain (Mechanics), Isotropism, Spheres, Geometry, Statistical analysis, Viscoelasticity, Reviews

Existing rigorous theories of prediction of macroscopic elastic behavior of random media are discussed. Attention is focused on statistically homogeneous and isotropic multiphase materials and polycrystals and on fiber reinforced materials. Direct approaches for dilute suspension theory and variational approaches for arbitrary phase fractional volumes are surveyed. New results are given for elastic behavior of cubic polycrystalline mixtures and for a couple stress constant of a dilute spheres suspension. (Author)

**AD-622 592 Div. 25/6 ,25/7**
*INSTITUTE OF OPTICS UNIV OF ROCHESTER N Y*
**ONE- AND TWO-PHOTON TRANSITIONS OF ATOMS IN SOLIDS,**
by Albert Gold, and John P. Hernandez. 12 Apr 65, 6p.
AROD , 5314:1

Unclassified report

Pub. in The Physical Review v139 n6A pA2002-07 13 Sep 1965 (Copies not available to DDC or Clearinghouse customers). Research supported in part by a grant from the National Science Foundation and in part under contract with the U. S. Army Research Office, Durham.

Descriptors: (*Photons, Electron transitions), (*Sodium compounds, Chlorides), Atoms, Solids, Absorption spectrum, Solid state physics, Parity, Silver, Ions, Temperature, Ruby, Lasers, Ultraviolet spectroscopy

The theory of one- and two-photon transitions between a given pair of impurity levels of the same parity is developed. As is well known, lattice vibrations assist the otherwise forbidden one-photon transition, increasing its intensity with temperature. The two-photon transition rate is shown to have a complementary decrease with increasing temperature. A measurement of both temperature dependences determines the effective frequency and coupling constant for the interaction. The formalism is applied to predicting the two-photon transition rate for the 4d (10)-4d (9)5s transition of the silver ion in NaCl:Ag. For an experiment using a ruby laser and an ultraviolet beam the maximum absorption coefficient predicted for the ultraviolet beam is 3.2 x 10 to the 48th power FN/cm at low temperatures, where F is the flux (photons/sq cm sec) of the laser and N is the Ag+ concentration. This should be within reach of present experimental techniques. (Author)

**AD-622 639 Div. 25/6**
*FLORIDA UNIV GAINESVILLE*
**RANDOM VIBRATIONS OF A NONLINEAR ELASTIC BEAM,**
by Richard E. Herbert. 30 Jan 64, 6p. Contract AF AFOSR675 64
AFOSR , 65-1233

Unclassified report

Pub. in The Journal of the Acoustical Society of America v36 n11 p2090-4 Nov 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Vibration, Beams (Structural)), (*Beams (Structural), Elasticity), Potential theory, Nonlinear systems, Stochastic processes, Partial differential equations

The theory of the Markoff process and the associated Fokker-Planck equation is used to investigate the large vibrations of a hinged, axially restrained, elastic beam driven by white noise. An expression for the joint probabilitydensity function of the first N modal amplitudes is obtained and used to derive an approximate expression for the mean-squared displacement. Numerical integration of the exact expression for the mean-squared displacement indicates a reduction of this quantity

as compared to the linear theory. Calculations also show a range of applicability of the derived approximate expression. Furthermore, computations show that the first node still gives a good estimate of the mean-squared displacement but the coupling effects of the nodes are so strong, for sufficiently large deflections, that the effect of the higher modes must be taken into account when computing the mean-squared value of the first mode. (Author)

**AD-622 648 Div. 25/6 ,25/2 ,4/2**
*TEXAS UNIV AUSTIN DEPT OF CHEMICAL ENGINEERING*
**THE PHASE EQUILIBRIA AND CRYSTAL CHEMISTRY OF THE RARE EARTH GROUP VI SYSTEMS. I. ERBIUM-SELENIUM,**
by D. J. Haase, H. Steinfink, and E. J. Weiss. 8 Sep 64, 3p. Contract AF AFOSR62 237
AFOSR , 65-1383

Unclassified report

Pub. in Inorganic Chemistry v4 n4 p538-40 Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Erbium alloys, Phase studies), (*Selenium alloys, Phase studies), Thermodynamics, Crystal structure, X-ray diffraction analysis, Melting, Erbium compounds, Selenides, Solid solutions, Eutectics, Transformations, Single crystals

The phases occurring in the erbium-selenium system are: ErSe, f.c.c., a = 5.662 A., m.p. 1630; the solid solution series, Er2Se3-Er3Se4, orthorhombic, Fddd, a = 11.38 A., b = 8.09 A., c = 24.20 A., m.p. 1400-1440; alpha-ErSe2, orthorhombic, Cmma, a =16.22A., b = 15.80 A., c = 11.88 A., transition to beta-ErSe2 at 890C; beta-ErSe2, orthohombic, Immm, a = 4.061 A., b = 5.571 A., c = 13.16 A., peritectic at 1010C. Two eutectics were observed at approximately 3 atom % selenium and 1310C and approximately 55.5 atom % selenium and 1370C. (Author)

**AD-622 654 Div. 25/6**
*TECHNION - ISRAEL INST OF TECH HAIFA DEPT OF AERONAUTICAL ENGINEERING*
**BUCKLING OF CIRCULAR CONICAL SHELLS UNDER COMBINED TORSION AND EXTERNAL OR INTERNAL PRESSURE,**
by Josef Singer, and Menachem Baruch. 1965, 25p. Contract AF EOAR62 61
AFOSR , 65-1234

Unclassified report

Pub. in Topics in Applied Mechanics, Memorial Vol. to Prof. Edwin Schwerin, Amsterdam, 1965 (Copies available to DDC users). Prepared in cooperation with Technion - Israel Inst. of Tech., Haifa. Dept. of Mechanics.

Descriptors: (*Structural shells, Buckling (Mechanics)), (*Buckling (Mechanics), Structural shells), (*Conical bodies, Structural shells), Pressure, Loading (Mechanics), Mathematical analysis, Structures, Torque, Differential equations, Boundary value problems

A method developed previously for the analysis of the instability of thin conical shells under external pressure is now extended to buckling under torsion and combined torsion and external or internal pressure as well as axisymmetric temperature distributions. The method is based on solution modified Donnell type stability equations, in the presence of slightly relaxed boundary conditions for the u and v displacements. Two formulations of the solution for torsion and combined loadings are given and compared. Typical examples are calculated and compared with results obtained by Seide and tests, and interaction curves for combined torsion and external and internal pressure loading are given and compared with experimental curves. For conical shells of small and medium taper ratio, the interaction curves may be approximated by the semi-empirical curve of Crate, Batdorf and Baab for cylindrical shells, but for larger taper ratio different curves are obtained. (Author)

**AD-622 695 Div. 25/6**
**CFSTI Prices: HC $2.00 MF $0.50**
*HARRY DIAMOND LABS WASHINGTON D C*
**VACUUM-DEPOSITED CADMIUM SULFIDE THIN FILMS,**
by G. G. Avis, W. C. Boesman, and D. W. Readey. 20 Jul 65, 41p. Rept. no. TR-1297
Proj. DA1P523801A300 ,HDL96300

Unclassified report

Descriptors: (*Semiconducting films, Vapor plating), (*Cadmium compounds, Sulfides), Vacuum apparatus, Resistance (Electrical), Heat treatment, Crystal structure, Sandwich construction, Electrical properties

Cadmium sulfides was vacuum-deposited onto glass substrates at approximately 0.00002 torr using electron beam heating. Initial resistivities were in the range 0.1 to 1 ohm-cm. After heating in vacuum at 360 to 370C for 1/2 hr, the resistivities increased to the range 0.3 to 300,000 ohm-cm. To correlate resistivity with crystal structure, the cadmium sulfide films were studied by means of X-ray and electron diffraction, and spectrophotometry. It was found that these cadmium sulfide films were hexagonal and highly oriented with the c-axis perpendicular to the plane of the substrate. Grain size perpendicular to the c-axis was much less than 100 A after deposition onto room-temperature substrates, and increased to 100 to 200 A in diameter after heat treatment. To determine the type of contact the commonly deposited metals make to cadmium sulfide, a mask changer was employed to allow the deposition of layerized arrays of metal-cadmium sulfide-metal in a single pumpdown. Aluminum, indium, silver, and gold were thereby deposited in several different electrode combinations. Combinations having aluminum as one (or both) of the electrodes exhibited rectifying characteristics; all other combinations exhibited ohmic characteristics. (Author)

**AD-622 699 Div. 25/6 ,14/8**
**CFSTI Prices: HC $2.00 MF $0.50**
*BROWN UNIV PROVIDENCE R I DIV OF ENGINEERING*
**APPROXIMATE METHODS FOR RIGID PLASTIC STRUCTURES SUBJECTED TO DYNAMIC LOADING,**
by M. A. Oien, and J. B. Martin. Aug 65, 35p.
Rept. no. BU/DTMB/7
Contract N189 181 57827A x, N189 18 59217A x

Unclassified report

Descriptors: (*Plasticity, Loading (Mechanics)), (*Loading (Mechanics), Plasticity), Numerical analysis, Structures, Continuum mechanics

Extensions of impulsive loading theorems for rigid-plastic continua and mode approximations for impulsively loaded rigid-plastic structures in the literature are considered. The extensions lead to bounds and approximate methods for bodies subjected to an initial impulse and time-dependent loads. Illustrative examples are given. (Author)

**AD-622 702 Div. 25/6 ,17/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*POLYTECHNIC INST OF BROOKLYN N Y*
**ELECTROMAGNETIC PROPERTIES OF METALS AND SEMI-CONDUCTORS.**
Status rept. for 1 Jul-1 Oct 65,
by H. J. Juretschke. 1 Oct 65, 3p. Contract Nonr83937 Proj. NR017 424

Unclassified report

Descriptors: (*Metals, Electromagnetic properties), (*Semiconductors, Electromagnetic properties), Magnetic properties, Silver, Metal films, Gadolinium, Solid state physics

Contents: Metallic field effect and the properties of thin silver films; Galvanomagnetic properties of gadolinium.

**AD-622 757 Div. 25/6 ,25/4**
*NATIONAL MAGNET LAB MASS INST OF TECH CAMBRIDGE*
**ROTATORY DISPERSION OF DIRECT EXCITON IN GERMANIUM,**
by Y. Nishina, J. Kolodziejczak, and B. Lax. 1964, 8p. Contract AF19 604 7344 Proj. 9764

AFOSR , 65-1172

Unclassified report

Intern. Conf. Phys. Semicond. (7th), Paris, France, p867-71 19-24 Jul 1964 (Copies available only to DDC users).

Descriptors: (*Excitation, Germanium), (*Magneto-optic effect, Germanium), (*Germanium, Excitation), Phase shift, Electrons, Cryogenics, Semiconductors

Since the oscillatory behavior of the interband Faraday effect was observed in Ge at room temperature, much interest has been focussed on how the Coulomb interaction between the excited electron and the hole would influence the line shapes of the rotatory dispersion. In order that this problem might be answered quantitatively with some experimental evidence, it was necessary to measure the rotatory dispersion for a single energy state of a direct exciton in a pair of nondegenerate conduction and valence bands. Experimental results are presented on the Faraday rotation and the Voigt effect of the direct excitons at gamma points in Ge near liquid helium temperature. Good agreement was obtained between the experimental results and those calculated for the Faraday rotation in the photon energy range up to 0.900 ev. (Author)

**AD-622 781 Div. 25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS MATERIALS ENGINEERING DIV*
**STRESS INTENSITY FACTORS FOR SINGLE EDGE CRACKS IN RECTANGULAR SHEET WITH CONSTRAINED ENDS.**
Technical rept.,
by Oscar L. Bowie, and Donald M. Neal. Aug 65, 19p. Rept. no. AMRA-TR-65-20
Proj. DA 1C014501B32A

Unclassified report

Descriptors: (*Shuts, Fracture (Mechanics)), (*Fracture (Mechanics), Sheets), (*Elasticity, Sheets), Stresses, Mathematical analysis, Conformal mapping, Structural properties, Numerical analysis, Complex variables, Boundary valve problems

The stress intensity factors at the crack roots for single edge cracks in a rectangular sheet with constrained ends are considered. The stress analysis for this mixed boundary problem is carried out using conformal mapping and complex variables. Numerical results are obtained for varying crack lengths and length-to-width ratios of the sheet over a range considered of practical interest for the use of short test specimens. (Author)

**AD-622 813 Div. 25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*LOUVAIN UNIV (BELGIUM)*
**MEASUREMENTS AND RESULTS WITH ELECTROLUMINESCENT POWDERS (ZNS ACTIVATED).**
Technical note,
by A. Luyckx. Oct 58, 9p. Rept. no. TN-3
Contract AF61 514 1118

Unclassified report

Descriptors: (*Sulphides, Electroluminescence), (*Electroluminescence, Semiconductors), (*Semiconductors, Electrolumines-

cence), (*Zinc compounds, Sulphides), Electric currents, Measurement, Powders, Dielectric properties, Phosphorescent materials, Belgium, Crystal lattices

Topics include: general characteristics of semiconductors, band diagrams for semi-conductors and for electroluminescent ZnS, and measurements made with E. L. ZnS in vacuum.

**AD-622 820 Div. 25/6 ,4/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*ATHENS UNIV (GREECE)*
**INVESTIGATION OF HEAT VIBRATIONS IN SOLIDS BY USING X-RAYS.**
Annual rept. no. 4, 1 Feb 60-31 Jan 61,
by Alexander Theodossiou. 31 Jan 61, 14p. Contract AF61 514 1248
AFOSR , 840

Unclassified report

See also AD-272 414.

Descriptors: (*Metals, Vibration), (*X-ray diffraction analysis, Metals), Silver, Platinum, Lead, Gold, Thallium, Solids, Heat, Temperature, Measurement

A suitable furnace was constructed enabling the annealing of samples in an inert gas stream up to 700C. A suitable vacuum chamber was constructed to extend the measurements on the Philips goniometer at low temperature. Measurements were carried out on Silver and Gold at low temperature, on Lead at high temperature and on Platinum at high and low temperature. Experiments were also made on Thallium.

**AD-622 830 Div. 25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*DELAWARE UNIV NEWARK DEPT OF PHYSICS*
**ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-LIKE FIELD DISTRIBUTIONS IN PHOTOCONDUCTORS.**
Status rept. no. 6, 1 Aug-1 Oct 65,
by K. W. Boer. 1 Oct 65, 2p. Contract Nonr433600

Unclassified report

Descriptors: (*Semiconductors, Field theory), (*Photoelectrid materials, Field theory), Electric currents

A brief summary is given of work on field and current distributions in semiconductors and layer-like field distributions in photoconductors.

**AD-622 834 Div. 25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*STANFORD UNIV CALIF DEPT OF AERONAUTICS AND ASTRONAUTICS*
**STRUCTURAL INSTABILITY INDUCED BY CREEP.**
Technical rept.,
by Robert L. Carlson. Sep 65, 25p. Rept. no. SUDAER-244 ,TR-14
Contract Nonr22530 ,Nonr22547 Proj. NR064 425

Unclassified report

Descriptors: (*Creep, Structural parts), (*Structures, Buckling (Mechanics)), Mathematical analysis, Stability, Theory, Stresses, Metal plates, Loading (Mechanics), Linear systems

The application of the linearized theorized of Robotnov and Shesterikov and of Onat and Wang to creep buckling is examined and an investigation of the associated disturbance-response behavior is made. It is shown that a precise and consistent criterion for stability that has both theoretical and experimental support is possible within the scope of linearized theory. The linearization procedure of Onat and wang is extended to multiaxial stress states and the problem of a compressively loaded rectangular plate subject to creep is analyzed. (Author)

**AD-622 853 Div. 25/6 ,25/3**
*CHICAGO UNIV ILL INST FOR THE STUDY OF METALS*
**HIGH-STRESS PIEZORESISTANCE AND MOBILITY IN DEGENERATE SB-DOPED GERMANIUM,**
by M. Cuevas, and H. Fritzsche. 1 Oct 64, 9p. Contract AF AFOSR62178 Proj. 9763 Task 976302
AFOSR , 65-1376

Unclassified report

Pub. in The Physical Review v137 n6A pA1847-55 15 Mar 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Transport properties, Germanium), (*Resistance (Electrical), Germanium), (*Semiconductors, Transport properties), (*Germanium, Semiconductors), Stresses, Compressive properties, Piezoelectric effect, Impurities, Antimony, Cryogenics, Anistropy, Tunneling (Electronics)

The resistivity of germanium containing between N=3 X 10 to the 17th power and 10 to the 19th power antimony atoms per cc was measured at 1.2K under uniaxial compressions of up to 10 to the 10th power dyn/cm. sq. These stresses are high enough to effect an observable saturation in the piezoresistance, that is, to transfer all electrons to a single conduction-band valley (111) compression) or to two valleys ( (110) compression). Two distinct ranges are observed in degenerate germanium: for N<10 to the 18th power/cc the mobility increases with N and shows impurity-band effects; for N>10 to the 18th power/cc the mobility decreases and ionized-impurity scattering is the dominant scattering process. The latter range is N>3X10 to the 18th power/cc for large (111) compression. The resistivity was measured for current flowing parallel and perpendicular to the stress direction. The mobility anistropy was found to be =3.9=0.1 for N>4X10 to the 18th power/cc. This indicates that the mean free path is nearly isotropic. The mobility for electrons in 1, 2, and 4 valleys is compared with Csavinszky's partial-wave treatment of impurity scattering. The change of screening with the number of valleys was tken into account. Csavinszky's theory overestimates the N dependence and the magnitude of the scattering. This is attributed to the failure of the individual-scattering assumption. (Author)

**AD-622 884 Div. 25/6 ,25/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*SYLVANIA ELECTRONIC SYSTEMS WALTHAM MASS APPLIED RESEARCH LAB*
**SOLID STATE TECHNIQUES OF MODULATING OPTICAL WAVES.**
Quarterly rept. no. 1, 1 Apr-1 Jul 65.
1 Jul 65, 35p. Contract DA28 043AMC01283E

Unclassified report

Descriptors: (*Light, Modulators), (*Modulators, Light), (*Optical equipment, Solid state physics), (*Solid state physics, Optics), Electron optics, Amplitude modulation, Crystals, Dielectric properties, Thermal conductivity, Potassium compounds, Phosphates, Arsenic compounds, Microwave equipment, Light communication systems, Lasers

The first quarter of this project was devoted primarily to the selection of an optimum material for the construction of a wide bandwidth traveling wave optical modulator. Our conclusion from this survey is that the most promising materials for this purpose are KDP and KDA. The criteria applied in selecting the optimum electro-optic material comprised availability, microwave performance, machinability, and optical characteristics. The characteristics of availability and microwave performance essentially confine our attention to the isomorphs of KDP. Such materials as KTN, cuprous chloride, zinc sulfide, and so forth were not considered in detail. The first step in evaluating the various materials was to collect together all the data on material properties which are available in the literature. A few gaps in this data were filled by experimental measurements made in this laboratory. The dielectric constant for RDA and the thermal conductivity of RDA, KDA, ADA were measured. Simultaneously with this measurement of the material properties, we composed a computer routine to calculate the microwave performance of a model which takes into account the electro-optic and the dielectric properties of the electro-optic material. (Author)

**AD-622 901 Div. 25/6**
*ILLINOIS UNIV URBANA*
**THE ATOMIC VOLUMES OF SILICON, GERMANIUM, AND TIN,**
by T. Yoshioka, and Paul A. Beck. 24 May 65, 3p.
AROD , 5103:4

Unclassified report

Pub. in Transactions of the Metallurgical Society of AIME v233 p1789 Sep 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Silicon, Atomic properties), (*Germanium, Atomic properties), (*Tin, Atomic properties), Solid state physics, Solid solutions, Silicon alloys, Germanium alloys, Tin alloys, Aluminum alloys, Copper alloys, Silver alloys, Gold alloys, Vanadium alloys, Chromium alloys, Manganese alloys, Iron alloys, Cobalt alloys, Nickel alloys, Tables

**AD-622 920 Div. 25/6**
*CHICAGO UNIV ILL INST FOR THE STUDY OF METALS*
**THEORY OF INDIRECT INTERBAND TUNNELING IN SEMICONDUCTORS,**
by J. J. Tiemann, and H. Fritzsche. 28 Oct 64, 6p. Contract AF AFOSR148 63 Proj. 9763 Task 976302
AFOSR , 65-1375

Unclassified report

Pub. in The Physical Review v137 n6A pA1910-3 Mar 15 1965 (Copies not available to DDC or Clearinghouse customers.)

Descriptors: (*Tunneling (Electronics), Semiconductors), (*Semiconductors, Field theory), Perturbation theory, Phonons, Electrons, Matrix algebra, Hydrostatic pressure, Germanium

The theory of phonon-assisted tunneling by Keldysh and Kane is extended to incorporate the phonon interaction in a manner that is consistent with the requirements of crystal symmetry. Perturbation theory is used to evaluate the tunneling matrix element. The unperturbed wave functions are taken to be the approximate eigenstates of the pure crystal in a weak uniform field, as presented by Kane. The electron-phonon interaction is treated as the perturbation. Although the magnitude of the tunnel current agrees with experiment, the observed difference between the pressure coeffi-cients of the transverse acoustical and the longitudinal acoustical phonon-assisted tunnel currents is not reproduced by the theory. It is concluded that Kane's 'perfectl/ reflected' wave functions are not sufficiently good approximations for the calculation of phonon-assisted tunneling in germanium. (Author)

**AD-622 961 Div. 25/6**
**CFSTI Prices: HC $5.00 MF $1.00**
*CARNEGIE INST OF TECH PITTSBURGH PA DEPT OF ELECTRICAL ENGINEERING*
**NGE-PGAAS HETEROJUNCTIONS.**
Interim technical rept.,
by Arthur R. Riben. Feb 65, 166p. Contract DA31 124ARO D131
AROD , 3397:7

Unclassified report

Descriptors: (*Composite materials, Semiconductors), (*Semiconductors, Tunneling (Electronics)), (*Tunneling (Electronics), Semiconductor devices), Germanium, Gallium alloys, Arsenic alloys, Semiconductor devices, Epitaxial growth, Electrical properties

This thesis presents a model which includes the effect of carrier tunneling throught the forbidden energy region of the semiconductors, and shows that the experimental characteristics of nGe-pGaAs heterojunctions are explained by recombination-tunneling mechanisms, which are different for the forward and reverse directions. The predominance of the tunneling current over the thermal current in nGe-pGaAs devices is shown to be the result of a large energy discontinuity between the valence bands of the two materials. The methods of fabricating these heterojunctions are discussed, and it is shown that the electrical characteristics are related to the original substrate preparation. The work indicates that growths on cleaved substrates will have the smallest number of interface defects, and thus the subsequent devices will have the lowest current densities. Injection studies were also carried out on many devices, and the results were consistent with the existence of a majority carrier tunneling mechanism as the predominant cause of charge transport. A conclusion drawn from this work is that in order to further study the possibility of obtaining increased emitter injection efficiency be means of a wide band-gap emitter transistor, the base material should be of the conductivity type such that the minority carriers are in the energy band which has the smaller discontinuity. (Author)

**AD-623 030 Div. 25/6 ,25/7 ,25/2**
*ARMY ELECTRONICS LABS FORT MONMOUTH N J*
**LINE SHAPES OF RESONANT, NONLINEAR, PARAMAGNETIC SUSCEPTIBILITIES,**
by H. G. Andresen, and H. Welling. 8 Feb 65, 13p.

Unclassified report

Pub. in Physical Review v139 n1A pA321-33 Jul 5 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Paramagnetic resonance, Line spectrum), (*Line spectrum, Ruby), (*Crystal oscillators, Magnetic properties), Magnetic resonance, Crystals, Excitation, Harmonic oscillators, Crystal lattices, X band, Quantum mechanics, Relaxation oscillators

Line shapes for the absolute value and the real and imaginary components of the nonlinear, paramagnetic susceptibility of a ruby rystal have been measured as a function of the magnetic field and crystal orientation at room temperature and 'resonant' conditions, where the X-band driving frequency coincides with or is very close to the resonance frequencies of an equidistant or nearly equidistant paramagnetic three-level system. A quantitative comparison between theory and experiment exhibited systematic discrepancies, such as too slowly decaying wings for the theoretical curves and too large theoretical amplitudes at 'partly resonant' conditions for nearly equidistant three-level schemes. Since the approach towards thermal equilibrium within tightly coupled spin systems in solids has, in general, to be described by nonexponential relaxation processes, the line-shape expressions for the nonlinear susceptibility were phenomenologically generalized and formulated in terms of non-Lorentzian-shaped, homogeneous, singlequantum resonances. By using generalized line-shape expressions, it was possible to achieve a satisfactory quantitative agreement with all experimental results for both the line shapes of single-quantum, linearsusceptibility resonances as well as for the line shapes of the absolute value and the real and imaginary components of the nonlinear-susceptibility resonances. (Author)

**AD-623 045 Div. 25/6 ,4/4**
*STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE*
**PHOTO-HALL STUDIES OF OXYGEN ADSORPTION EFFECTS ON PHOTOCONDUCTIVITY IN SINTERED LAYERS.**
Master's thesis,
by Arthur L. Robinson, and Richard H. Bube. 2 Apr 65, 5p.
AROD , 4119:6

Unclassified report

Pub. in Journal of the Electrochemical Society v112 n10 p1002-5 Oct 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Semiconductors, Chemisorption), (*Hall effect, Chemisorption), (*Photoconductivity, Chemisorption), (*Cadium compounds, Photoconductivity), (*Chemisorption, Semiconductors), Sulfides, Selenides, Oxygen, Adsorption, Heat treatment

The Hall mobility and the free electron density in sintered layers of CdS-CdSe were measured as a function of photoexcitation intensity, temperature, and ambient atmosphere. Both free carrier density and Hall mobility are reduced by the adsorption of oxygen and increased by the desorption of oxygen. The magnitudes of the effects are such that in all cases the Hall mobility change due to adsorption contributes significantly to the photoconductivity change. Effects associated with photoadsorption of oxygen are reversible by annealing in vacuum. Results can be consistently described in terms of the model for chemisorption of oxygen on sintered layers proposed by Shear, Hilton, and Bube. (Author)

**AD-622 308 See Fld. 20/6**

**AD-622 323 See Fld. 20/2**

**AD-622 380 See Fld. 20/3**

**AD-622 424 See Fld. 9/1**

**AD-622 426 See Fld. 20/3**

**AD-622 451 See Fld. 20/14**

**AD-622 453 See Fld. 7/4**

**AD-622 491 See Fld. 12/1**

**AD-622 496 See Fld. 20/2**

**AD-622 543 See Fld. 11/6**

**AD-622 575 See Fld. 20/14**

**AD-622 613 See Fld. 12/1**

**AD-622 635 See Fld. 5/1**

**AD-622 640 See Fld. 20/6**

**AD-622 647 See Fld. 20/2**

**AD-622 688 See Fld. 11/5**

**AD-622 774 See Fld. 5/1**

**AD-622 851 See Fld. 20/13**

**AD-622 881 See Fld. 11/6**

**AD-622 905 See Fld. 20/3**

**AD-622 919 See Fld. 20/8**

**AD-622 926 See Fld. 14/2**

**AD-622 927 See Fld. 20/3**

**AD-622 954 See Fld. 20/8**

**AD-622 981 See Fld. 1/4**

**AD-623 000 See Fld. 20/6**

**AD-623 009 See Fld. 20/3**

## 20/13. THERMODYNAMICS

**AD-622 358 Div. 25/8 ,26/6 ,15/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**FUNDAMENTAL SOLUTION FOR APPROXIMATE EQUATIONS OF THE STATIONARY PROBLEM OF THE THERMAL CONDUCTIVITY OF MILDLY SLOPING DIAPHRAGMS,**
by S. Ya. Yarema. 8 Oct 65, 11p. Rept. no.
FTD-TT-65-1140
TT , 65-64148

Unclassified report

Unedited rough draft trans. of Voprosy Mekhaniki Realnogo Tverdogo Tela (USSR) n3 p88-94 1964.

Descriptors: (*Thermal conductivity, Numerical analysis), (*Diaphragms (Mechanics), Thermal conductivity), Integral transforms, Differential equations, USSR

The equations of thermal conductivity for mildly sloping diaphragms are examined under limiting conditions of the third type. The fundamental solution to the equations is obtained by the method of integral transformations. (Author)

**AD-622 691 Div. 25/8 ,4/4**
*WARNER AND SWASEY CO FLUSHING N Y CONTROL INSTRUMENT DIV*
**APPLICABILITY OF INFRARED EMISSION AND ABSORPTION SPECTRA TO DETERMINATION OF HOT GAS TEMPERATURE PROFILES,**
by Richard H. Tourin, and Burton Krakow. 5 Jun 64, 8p. Contract AF49 638 1132 Proj. 9711 Task 971101
AFOSR , 65-1436

Unclassified report

Pub. in Applied Optics v4 n2 p237-42 Feb 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Gases, Thermodynamics), (*Thermodynamics, Infrared spectroscopy), (*Infrared spectroscopy, Thermodynamics), Spectra (Infrared), Absorption spectrum, Infrared radiation, Determination, Flames, Mathematical analysis

Changes in infrared emission and absorption spectra of hot gases brought about by controlled variations of gas temperature profile were measured. Spectral emission-absorption temperatures were

determined from the spectral data as a function of wavelength, using the Kirchhoff and Planek laws. These temperatures proved independent of wavelength for an isothermal profile, despite a large variation of absorptance with wavelength. For nonisothermal profiles, the emissionabsorption temperature varied with wavelength in a characteristic manner for each profile. These results established more firmly the validity of the infrared emission-absorption technique of gas temperature measurement, and confirmed a previous hypothesis that the wavelength dependence of spectrally determined temperature, observed for most flames, is a temperature profile effect. The spectral emittance equation for a gas was formulated in terms of observable quantities for isothermal and nonisothermal cases, taking the spectrometer slit function into account. (Author)

**AD-622 798 Div. 25/8 ,25/2**
**CFSTI Prices: HC $2.00 MF $0.50**
*BRUSSELS UNIV (BELGIUM)*
**STATISTICAL MECHANICS OF IRREVERSIBLE PROCESSES IN CRYSTALS. PART I.**
Technical rept.,
by I. Prigogine, and R. Bingen. 1955, 45p. Contract AF61 514 635C
EOARDC , TN-54P1

Unclassified report

Report on Statistical Mechanics of Irreversible Processes.

Descriptors: (*Crystal lattices, Harmonic oscillators), (*Statistical mechanics, Crystal lattices), Irreversible processes, Thermodynamics, Statistical processes, Brillouin zones, Perturbation theory, Statistical distributions

Irreversible phenomena in crystals, which are not related to processes involving energy dissipation, are studied. An infinite three-dimensional assembly of narmonic oscillators is studied; their position and velocities are considered as random variables whose probability distributions are known at the initial moment. The asymptotic values of these distribution functions can be calculated by solving the equations of motion of the lattice points in terms of the initial conditions. 'Influence functions' are introduced, which are related to the frequency spectrum of the lattice. The second moments are shown to be quasi-invariant, i.e. they tend to a definite asymtotic value after a more or less complicated variation. No other condition is imposed on the initial distribution functions than the absence of correlation at large distances. If they are such that the equipartition of the energy is initially achieved between the normal modes, without any correlation between their phases, all the various moments and local distribution functions tend to their equilibrium value.

**AD-622 799 Div. 25/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*BRUSSELS UNIV (BELGIUM)*
**STATISTICAL MECHANICS OF IRREVERSIBLE PROCESSES AND THE STEADY STATE, PART II.**
Technical rept.,
by I. Prigogine, and R. Brout. 1955, 25p. Contract AF61 514 635C
EOARDC , TN-54 P2

Unclassified report

Report on Statistical Mechanics of Irreversible Processes. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Thermodynamics, Irreversible processes), (*Statistical mechanics, Irreversible processes), Heat transfer, Thermal conductivity, Solids, Entropy, Harmonic oscillators, Statistical processes

The thermodynamic consequences of previous studies on the statistical mechanics of irreversible processes in harmonic systems is examined. It is found that the entropy, corresponding to the asymptotic distribution in time is a maximum, defined on the sub-surface given by the mechanical invariants of the system. Anharmonicities are introduced into the system which destroy all mechanical invariants other than the energy, thereby allowing the system to come to the standard canonical ensemble (energy the only mechanical invariant). The evolution of entropy is examined using equations previously developed by Peierls in the study of thermal conductivity of solids. The stationary state of heat flow is examined in the presence of a temperature gradiant. The stationary state arises from harmonic propagation of the gradient compensated by local decay of heat flow due to anharmonicities. It is shown to correspond to a state of minimum entropy production for fixed gradient, thereby corroborating a well known theorem in phenomenological irreversible thermodynamics.

**AD-622 800 Div. 25/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*BRUSSELS UNIV (BELGIUM)*
**THERMAL CONDUCTIVITY OF REAL GASES, PART III.**
Technical rept.,
by I. Prigogine, and S. Lafleur. 1955, 15p. Contract AF61 514 635C
EOARDC , TN-54 P3

Unclassified report

Report on Statistical Mechanics of Irreversible Processes. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Thermal conductivity, Gases), (*Statistical mechanics, Irreversible processes), Kinetic theory, Transport properties, Pressure, Molecules, Heat transfer, Argon

In a real gas, in the presence of a temperature gradient, the relative concentrations of the molecular clusters vary from point to point; this leads to a diffusion of the larger clusters towards the warm regions and of the smaller clusters and monomolecules towards the cold parts of the apparatus, where they respectively dissociate or recombine with the absorption or liberation of the heat of formation. The increase in the thermal conductivity of the gas resulting from this circulation of the heat of formation of the clusters can be evaluated with reasonable accuracy at low pressures when only simple and double molecules need to be taken into account. This effect is negligible at high temperatures (above the Boyle point), where the variation of thermal conductivity with pressure can be represented to a high degree of accuracy by Enskoyg's theory; it increases with decreasing temperature, and becomes approximately equal to Enskog's effect in the neighborhood of the critical temperature; it is evaluated that in the case of argon the increase is of the order of 6% per atm. at the boiling point.

**AD-622 801 Div. 25/8 ,25/2 ,25/5**
**CFSTI Prices: HC $3.00 MF $0.50**
*BRUSSELS UNIV (BELGIUM)*
**QUANTUM EFFECTS AT ABSOLUTE ZERO IN PURE CRYSTALS AND ISOTOPIC MIXTURES. PART V.**
Technical rept.,
by I. Prigogine, and R. Bingen. 1955, 54p. Contract AF61 514 635C
EOARDC , TN-54 P5

Unclassified report

Report on Statistical Mechanics of Irreversible Processes.

Descriptors: (*Crystals, Quantum mechanics), (*Statistical mechanics, Irreversible processes), (*Isotopes, Solidified gases), Hydrogen, Helium, Cryogenics, Thermodynamics, Kinetic theory, Phase studies, Crystal lattices, Motion

The influence of the anharmonicity of motion is studied, in connection with the properties at very low temperatures of solids such as H2, He and their isotopes, which are sufficiently light to display large quantum effects. The properties of pure crystals at absolute zero are studied. The volume, the free energy and the Debye temperature are calculated as functions of de Boer's quantum parameter. The mass effect in solid isotopic mixtures, i.e. the influence of the spatial distribution of the two isotopes upon the zeropoint energy is studied. The volume effect is discussed, i.e. the volume change and the corresponding variation of zeropoint energy which occur when two isotopes are mixed. This volume effect is more important than the mass effect, at least for light substances. It is first evaluated in the case of one-dimensional crystals. The calculations are then extended to real three-dimensional crystals, showing that the excess free energy is always positive.

**AD-622 825 Div. 25/8 ,21/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*MICHIGAN UNIV ANN ARBOR LIQUID METALS LAB*
**INVESTIGATION OF LIQUID METAL BOILING HEAT TRANSFER.**
Rept. for May-Aug 65,
by Richard E. Balzhiser, Bruce F. Caswell, Andrew Padilla,Jr., Robert E. Barry, and Robert L. Gahman. Aug 65, 48p. Rept. no. 05750-23-P
Contract AF33 657 11548 Proj. ORA 05750

Unclassified report

See also AD-606 826.

Descriptors: (*Liquid metals, Heat transfer), (*Heat transfer, Liquid metals), (*Heat exchangers, Liquid metal coolants), (*Liquid metal coolants, Heat transfer), Film boiling, Condensation, Pressure, Transition temperature, Alkali metals, Surface properties, Thermal conductivity, Cesium, Rubidium, Sodium, Potassium

Critical heat flux determinations with rubidium continued. Burnout results along with other liquid metal burnout data were correlated with a dimensionless relation. A film boiler yielded data over pressure range of 2 - 19mm mercury. The data falls slightly above the predictions of Berenson for potassium film boiling at a pressure of a 0.1 atm. Data obtained for which the surface temperature exceeded the saturation temperature by greater than 700F yielded reasonably consistent results when the flux was calculated by two independent procedures. At lower values of the surface temperature, unusual behavior was encountered which is probably related to transitional effects which began to occur on the wall of the vessel near the boiling plate. A forced circulation apparatus was operated to yield condensing coefficients for sodium over a temperature range of 1240F to 1525F and a range of heat fluxes from 215,000 to 583,000 BTU/ (hr.) (Sq. ft.). The condensing coefficient was observed to be essentially constant over these ranges at a value of 10,800=3,300 BTU/ (hr.) (sq. ft.) (F).

**AD-622 851 Div. 25/8 ,25/2 ,25/6**
*UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING*
**THE THERMODYNAMICS OF IMPERFECTIONS IN AGBR,**
by F. A. Kroger. 28 May 64, 10p. Contract AF AFOSR496 65
AFOSR , 65-1461

Unclassified report

Pub. in The Journal of Physics and Chemistry of Solids v26 p901-9 1965 (Copies available only to DDC users).

Descriptors: (*Silver compounds, Bromides), (*Crystal lattice defects, Silver compounds), (*Thermodynamics, Crystal lattice defects), Enthalpy, Entropy, Electrical properties, Semiconductors

Analysis of experimental data available in the literature leads to an evaluation of the enthalpies and entropies of formation of native atomic and electronic imperfections. Estimates are made for the free enthalpy of formation of neutral and charged Schottky defects, which show that bromine vacancies are always a minority species. (Author)

**AD-622 887 Div. 25/8 ,25/5**
*COURANT INST OF MATHEMATICAL SCIENCES NEW YORK UNIV N Y*
**STATISTICS OF THE THERMAL RADIATION FIELD.**
Rev. ed.,
by Evelyn Fox Keller. 27 Jan 65, 12p. Rept. no. EL-9
Contract Nonr28548 Proj. NR371 146
Unclassified report

Pub. in Physical Review v139 n1B p B202-11 Jul 12 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript received 8 Dec 1964.

Descriptors: (*Thermal radiation, Field theory), (*Field theory, Quantum statistics), Statistical mechanics, Electromagnetic fields, Matrix algebra, Bosons

The characteristic functional is calculated for a system of bosons obeying linear field equations. The system is assumed to be in equilibrium. From the characteristic functional, the moments and distribution functions of an arbitrary number of field components are derived. It is shown how to obtain the density matrix from the characteristic functional, and, for the system in question, the original density matrix is recovered. Explicit calculations are performed for the electromagnetic field in an unbounded domain and in a semi-infinite domain bounded by a perfectly conducting plane. (Author)

**AD-623 020 Div. 25/8 ,9/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF*
**TRANSPIRATION COOLING WITH LIQUID METALS. PART II. THEORETICAL DETERMINATION OF OPTIMUM COOLING PARAMETERS NEAR STAGNATION REGIONS.**
Technical rept.,
by William H. Thielbahr. Aug 65, 68p. Rept. no. NOTS-TP-3791
Task RMMP23 082 216 1F009 06 03
NAVWEPS , 8732 P2
Unclassified report

See also AD-620 983.

Descriptors: (*Liquid metal coalants, Fluid flow), (*Stagnation point, Liquid metal coolants), Boundary layer, Cooling, Vaporization, Heat transfer, Lithium, Tin, Copper, Liquid metals, Tungsten, Porous metals, Impregnation, Reactor coolants, Reentry vehicles, Rocket motor nozzles

Three cooling mechanisms associated with liquid metal transpiration near stagnation regions were investigated theoretically. The cooling mechanisms considered were boundary layer shielding, heat absorption by vaporization, and heat absorption within the matrix as coolant travels under the action of some pressure force to the hot surface. Optimum coolant flow rate necessary for complete vaporization of liquid coolant at the hot wall was derived from knowledge of these mechanisms. Lithium, tin, and copper were the metal coolants investigated, with gaseous helium being included for comparative purposes. Tungsten was the matrix material for all coolants. Results of this analysis demonstrate that each coolant's effectiveness depends on the magnitude of the heat flux. In general, low melting point is the desirable coolant property at low and intermediate heat fluxes, while low molecular weight and high heat of vaporization become the important properties at high heat fluxes. (Author)

**AD-622 356 See Fld. 20/4**

**AD-622 359 See Fld. 20/4**

**AD-622 365 See Fld. 20/4**

**AD-622 378 See Fld. 21/7**

**AD-622 382 See Fld. 20/12**

**AD-622 466 See Fld. 21/5**

**AD-622 625 See Fld. 7/4**

**AD-622 646 See Fld. 7/4**

**AD-622 759 See Fld. 7/4**

**AD-623 056 See Fld. 8/10**

## 20/14. WAVE PROPAGATION

**AD-622 401 Div. 8/6 ,25/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*HUGHES AIRCRAFT CO CULVER CITY CALIF RESEARCH AND DEVELOPMENT DIV*
**RADIATION PATTERN CHARACTERISTICS OF LINE SOURCES IN THE PRESENCE OF DIELECTRIC LAYERS.**
Scientific rept.,
by J. H. Harris. Jul 65, 49p. Rept. no. P-65-91, SR-2
Contract AF19 628 4349 Proj. 4600 Task 460001
AFCRL , 65-666
Unclassified report

See also AD-620 251.

Descriptors: (*Electromagnetic waves, Dielectrics), (*Antenna radiation patterns, Plasma sheath), (*Field theory, Antenna radiation patterns), Synthesis

A formulation is obtained for the radiation patterns of electric and magnetic line sources that are arbitrarily located in a layered dielectric environment. The effects of differing permittivity variations are investigated, and it is shown that relatively simple bounding functions may be established. It is also shown that layers may be employed to obtain both directive and smoothed patterns. (Author)

**AD-622 402 Div. 8/6 ,25/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*HUGHES AIRCRAFT CO CULVER CITY CALIF RESEARCH AND DEVELOPMENT DIV*
**THE NATURE OF LEAKY WAVES IN MULTIPLY LAYERED MEDIA.**
Scientific rept.,
by J. H. Harris. Aug 65, 42p. Rept. no. SR-3, P-65-96
Contract AF19 628 4349 Proj. 4600 Task 460001
AFCRL , 65-667
Unclassified report

Descriptors: (*Electromagnetic waves, Plasma sheath), (*Plasma sheath, Antenna radiation patterns), Beams (Electromagnetic), Field theory, Magnetic properties, Dielectric properties

Leaky waves in multiply layered plasma media are analyzed by considering the radiation pattern of a grounded magnetic line source in the presence of isotropic planar layers. It is shown that the propagation constants of the waves derive from the eigenvalues of surface waves on related, but simpler, structures and that radiated beams of great magnitude can be obtained. Methods of predicting the beam characteristics are presented and verified with computed patterns. (Author)

**AD-622 403 Div. 8/6 ,25/3 ,8/1**
**CFSTI Prices: HC $2.00 MF $0.50**
*HUGHES AIRCRAFT CO CULVER CITY CALIF RESEARCH AND DEVELOPMENT DIV*
**LEAKY WAVES AND THEIR APPLICATION TO SINGLE APERTURE MULTIPLE BEAM ANTENNAS.**
Scientific rept.,
by J. H. Harris. Aug 65, 34p. Rept. no. SR-4, P-65-99
Contract AF19 628 4349 Proj. 4600 Task 460001
AFCRL , 65-672
Unclassified report

Descriptors: (*Electromagnetic waves, Multiple beam antennas), (*Multiple beam antennas, Antenna radiation patterns), Plasma sheath, Field theory, Electromagnetic fields

The character of electromagnetic fields in layered plasma environments, excited by point sources, is investigated, with particular interest in the leaky waves. Experimental verification of the nature of the waves is shown. A new multiple beam antenna technique is presented and demonstrated by a two-channel model. (Author)

**AD-622 451 Div. 8/6 ,25/3 ,25/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**UKRAINIAN JOURNAL OF PHYSICS (SELECTED ARTICLES),**
30 Sep 65, 17p. Rept. no. FTD-TT-65-646
TT , 65-64176
Unclassified report

Edited trans. of Ukrayinskyi Fizychnyi Zhurnal (USSR) v9 n6 p593-8 659-63 1964.

Descriptors: (*Waveguides, Electromagnetic wave reflections), (*Semiconductors, Photoelectric effect), Optical properties, Magnetic fields, Plasma medium, Composite materials, Transport properties, Gallium alloys, Arsenic alloys, Intermetallic compounds, Electrical properties, Theory

Contents: Reflection of Electromagnetic Waves from the Open End of a Waveguide, by S. S. Kalmykova; Photoelectric Properties of Heterojunctions of Some Semiconductors, by Zh. I. Alf'orov, M. S. Zimogorova, et al.

**AD-622 575 Div. 8/5 ,25/4 ,25/6**
**CFSTI Prices: HC $4.00 MF $1.00**
*UNITED AIRCRAFT CORP EAST HARTFORD CONN RESEARCH LABS*
**ULTRASONIC LASER MODULATION TECHNIQUES.**
Final rept. for 1 Jul 64-30 Jun 65,
by A. J. DeMaria, D. E. Flinchbaugh, and G. E. Danielson Jr.. 30 Jun 65, 133p. Rept. no. D920259-12
Contract DA28 043AMC00259E Proj. DA 1P622001A056
Unclassified report

Continuation of Contract DA19 020AMC0170A. See also AD-613 196.

Descriptors: (*Lasers, Modulation), (*Light transmission, Modulation), (*Ultrasonic radiation, Modulators), (*Modulators, Ultrasonic radiation), Optics, Acoustics, Refraction, Diffraction, Mathematical models, Analog computers, Interferometers, Neodymium, Glass, Oscillators

The feasibility of internally modulating the output of solid-state lasers without having to insert lossy elements into the Fabry-Perot feedback interferometer has been demonstrated by the propagation of focused acoustic waves within a glass laser rod. These studies have shown that the establishment of an alternating convergingdiverging waveguide effect by the propagation of acoustic waves within the laser interferometer results in gating of a Nd (3+) glass laser at the acoustic frequency, an increase in output energy by as much as 100%, and an absence of discrete axial modes under gating conditions. The complexity of the integral equations describing the slope and trajectories of light rays traversing various periodic refractive index variations generated by acoustic waves led to the use of analog computer techniques for solving three differential equations for the slope and trajectories of the light rays. The use of the slope solutions for designing a Fabry-Perot laser interferometer configuration for pulse shaping the output of laser oscillators is described. The trajectory solutions describe the operation of the converging-diverging waveguide modulation effect within the laser's interferometer.

**AD-622 624L Div. 8/6**
*AIR FORCE CAMBRIDGE RESEARCH LABS BEDFORD MASS*
**A METHOD FOR ACCURATELY MEASURING THE VERTICAL ELECTRIC FIELD STRENGTH OF A PROPAGATING VLF WAVE.**
Instrumentation papers,
by R. P. Harrison, and E. A. Lewis. 15 Feb 65, 17p. Rept. no. AFCRL-65-664 ,IP-78
Proj. 4662
Unclassified report

Pub. in IEEE Transactions on Instrumentation and Measurement v1M14 p1/2 p89-97 Mar-Jun 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electric fields, Radio waves), (*Radio waves, Electric fields), Very low frequency, Electromagnetic waves, Propagation, Radio fields, Intensity, Measuring devices (Electrical + Electronics), Dipole antennas

**AD-622 708 Div. 8/6 ,25/3**
*AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS UPPER ATMOSPHERE PHYSICS LAB*
**THE SPECTRAL SHIFTS OF TRUNCATED SINUSOIDS.**
Physical sciences research papers,
by Kurt Toman. Aug 65, 11p. Rept. no. PSRP-120
Proj. 5631 Task 563111
AFCRL , 65-544
Unclassified report

Pub. in Journal of Geophysical Research v70 n7 p1749-50 Apr 1 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Radiofrequency spectroscopy, Frequency shift), (*Frequency shift, Radiofrequency spectroscopy), (*Wave transmission, Frequency shift), (*Electromagnetic waves, Frequency shift), Electromagnetism, Fourier analysis

The power spectrums of truncated sinusoids are computed. It is shown that the truncation process produces frequency shifts. These frequency shifts are particularly pronounced for short truncation lengths. (Author)

**AD-622 760 Div. 8/6**
**CFSTI Prices: HC $1.00 MF $0.50**
*MCGILL UNIV MONTREAL (QUEBEC)*
**STUDY OF THE ORIGIN OF MICROPULSATIONS IN CERTAIN FREQUENCY BANDS.**
Annual rept. for 15 Jul 64-15 Jul 65,
15 Jul 65, 3p. Contract DA ARO49 092G46
Unclassified report

Descriptors: (*Electromagnetic interference, Extremely low frequency), Measurement, Signals, Propagation, Electromagnetic pulses

A search was made for possible man-made signals received at our permanent site at Mont St. Hilaire, Quebec, with no attempts made to locate sources of signals. Measurements were made in three pass bands, viz.: 1 - 40 Hz, 0.2 - 3 Hz, 0.01 - 0.2 Hz.

**AD-622 876 Div. 8/6 ,25/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*STANFORD RESEARCH INST MENLO PARK CALIF*
**AN EXPERIMENTAL STUDY OF NONLINEAR PLASMA-WAVE INTERACTION.**
Scientific rept.,
by William C. Taylor. Aug 65, 44p. Rept. no. SR-1
Contract AF19 628 4800 Proj. 4600 ,SR1 5359 Task 460001
AFCRL , 65-654
Unclassified report

Descriptors: (*Antenna radiation patterns, Plasma jets), (*Plasma jets, Antenna radiation patterns), (*Slot antennas, Antenna radiation patterns), Radiofrequency power, L band, Electron density, Electric discharges, Electromagnetic waves, Propagation, Nonlinear systems, Experimental data

A study was made of the effect of pulsed L-band radiation from a slot antenna upon a layer of hot ionized air passing over the slot, and of the resulting time-resolved radiated power received by a monitoring antenna well beyond the plasma layer. The plasma layers were produced by an RF plasma jet and were nonuniform in electron density and collision frequency, similar to those expected in hypersonic flight through densities ranging between 0.0001 and 0.001 atmospheres. The plasma frequency at the maximum was varied between about one-tenth and twice critical. Measurements were made of the RF power thresholds required for producing (1) perceptible electron heating and (2) perceptible additional attenuation produced by RF-induced changes in the plasma conductivity. At low pressures, the electron heating thresholds were found to be considerably lower than required to produce new electrons in the hot gas, and about two orders of magnitude lower than required for breakdown in cold air at the same pressure. The thresholds for additional attenuation over the pressure range were about 8 db below the usual breakdown levels in cold air. The variation with pressure of power transmitted through the resulting plasma corroborates earlier experiments with discharges in cold air in a waveguide, showing a monotonic decrease as pressure decreases when the input power is much higher than the threshold required for nonlinear interaction. (Author)

**AD-622 950 Div. 8/6 ,8/3**
*NAVY ELECTRONICS LAB SAN DIEGO CALIF RADIO PHYSICS DIV*
**MEASUREMENT OF GROUP VELOCITY OF 17.8-KC/S VLF RADIO WAVES.**
Revised ed.,
by W. D. Westfall. 19 Apr 65, 4p.
Unclassified report

Pub. in Radio Science Journal of Research NBS/USNCURSI v69D n9 p1235-8 Sep 1965 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 24 Dec 64.

Descriptors: (*Radio waves, Velocity), Very low frequency, Ionospheric propagation, Atmospherics, Phase measurement, Errors, Radio signals

Group velocity of 17.8-kc/s VLF radio waves is determined by measuring the difference in time of arrival of the transmitted signals which travel over complementary great circle paths. The velocity is found to be 3.04 x 10 to the 8th power meters/second with an estimated error of approximately = 0.10 x 10 to the 8th power meters/second. Differences in measurement technique and general environmental conditions between this experiment and a previous measurement of 18-kc/s group velocity which was made in 1949 are discussed. (Author)

**AD-623 050 Div. 8/6 ,5/2**
**CFSTI Prices: HC $4.00 MF $0.75**
*GENERAL MILLS INC MINNEAPOLIS MINN*
**COMMUNICATION VIA ARTIFICIAL SCATTERERS PLACED BELOW THE IONOSPHERE,**
by Roy P. Schindler. 1 Dec 61, 109p. Rept. no. 2245
Contract Nonr158924 Proj. 85043
Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale. See also AD-401 672.

Descriptors: (*Stratosphere, Communication systems), (*Radio transmission, Scattering), (*Reflectors, Radio signals), Propagation, Airborne, Communication systems, Maintenance, Spheres, X-band, Diffraction gratings, Life expectancy, Communication equipment, Ionosphere

The possibility of creating a stable, efficient scatter propagation communication path below the ionsphere was investigated. This communication path would be free from interruptions due to ionospheric storms. Quite often communication by sky wave propagation is made impossible at any frequency and only ground waves and tropospheric scatter are useful for propagation beyond line-of-sight. Neither the low frequency channels, which must be resorted to for efficient ground wave transmission, nor tropospheric scatter circuits are very useful for tactical communication purposes. Both require high power, and elaborate antenna structures. Communication by tropospheric scatter is normally limited to a few hundred miles. The general approach taken in this study was suggested by Dr. William J. Thaler of the Office of Naval Research: Efficient scattering elements are to be generated and placed in the lower stratosphere within line of sight of two stations wishing to communicate. The majority of the work on this contract has centered on two important considerations; one, what will do the job of scattering, and two, how can we place the scatterers in the proper position and maintain them there. To be considered workable the scattering system must be capable of fulfilling the requirements of both considerations. (Author)

**AD-623 062 Div. 8/6 ,8/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**ELECTRIC WAVE PROPAGATION IN PERIODIC MEDIA.**
Master's thesis,
by Felix J. Gollucci. Aug 65, 44p. Rept. no. GE/EE/65-10
Unclassified report

Descriptors: (*Electromagnetic waves, Dielectrics), (*Dielectrics, Electromagnetic waves), Propagation, Waveguides, X-band, Microwave, theory, Differential equations, Mathematical analysis, Wave transmission

Wave propagation and frequency dispersion characteristics are investigated for electromagnetic wave propagation in a periodic medium. The permittivity is square wave stratified about an average value along a single coordinate. The propagation characteristics for TE waves are studied through an analysis of the Hill differential equation. Transmission characteristics and an omega-beta diagram are derived from a stability chart typical in the study of a Hill equation. Experimental

verification of predicted stop bands is accomplished with a standard laboratory microwave transmission system while the omega-beta diagram is experimentally verified by the well-known resonant cavity technique. (Author)

**AD-622 389** **See Fld. 3/1**

**AD-622 407** **See Fld. 20/3**

**AD-622 678** **See Fld. 4/2**

**AD-623 000** **See Fld. 20/6**

## 21/2. COMBUSTION AND IGNITION

**AD-622 459 Div. 10/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**MECHANISM OF VIBRATIONAL BURNING CONDITION OF GASEOUS MIXTURES,**
by S. K. Aslanov, and V. V. Kurzhunov. 12 Oct 65, 11p. Rept. no. FTD-TT-65-918
TT , 65-64184

Unclassified report

Unedited rough draft trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) v7 n8 p124-7 1964. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Combustion, Vibration), (*Gases, Combustion), Mixtures, Oscillation, USSR, Pipes, Flames, Acoustic properties, Stability, Fluid dynamic properties

Excitation and development of vibrations of gaseous mixture combustion in tubes are considered from the resonance point of view. The theoretical analysis of the problem is based on the idea of interaction between selfinduced acoustic vibrations and vibrations due to hydrodynamic instability of the flame front. Possibility of resonant excitation of the system depends on the waves of a definite length present in the system. The experimental data confirm fairly well the adopted point of view. (Author)

**AD-622 581 Div. 10/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*INSTITUTO NACIONAL DE TECHNICA AEROESPACIAL MADRID (SPAIN)*
**DIFFUSION FLAMES AND SUPERSONIC COMBUSTION.**
Final rept. for 1 Apr 63-1 Apr 65,
by I. Da Riva. 1 Apr 65, 23p. Contract AF EOAR43 63 Proj. 9711 Task 971101
AFOSR , 65-1604

Unclassified report

Descriptors: (*Space propulsion, Scientific research), (*Combustion, Supersonic characteristics), (*Diffusion, Flames), Chemical reactions, Air-breathing engines (Unconventional), Spain

This report presents a summary of work done on the behavior of reacting gases in supersonic combustion. The work undertaken comprises three areas: diffusion flames, combustion in the boundary layer, and combustion in a subsonic jet of fuel discharging in a supersonic coflowing stream of oxidizer. The structure of laminar diffusion flames has been analyzed in the limiting case of large, though finite, reaction rates. It is shown that the chemical reaction takes place only in a very thin region where convection effects may be neglected. The boundary layer flow past a hot wall is studied noting that the density at the outer edge of the boundary layer is much higher than the density close to the wall. (Author)

**AD-622 690 Div. 10/7 ,9/1 ,4/4**
*NEW YORK UNIV N Y DEPT OF CHEMISTRY*
**SOLUTION OF THE HYDRODYNAMIC EQUATIONS FOR LAMINAR TIME-INDEPENDENT FLAMES WITH ARBITRARILY LARGE DEVIATIONS FROM THE KINETIC STEADY STATE,**
by E. S. Campbell. Oct 64, 10p. Contract AF49 638 169
AFOSR , 65-1475

Unclassified report

Pub. in Combustion and Flame v9 n1 Mar 1965 (Copies available only to DDC users).

Descriptors: (*Flames, Fluid dynamic properties), Kinetic theory, Equations of state, Set theory, Combustion products, Fuels, Programming (Computers)

For the study of flame processes and their variation with fuel properties it is essential to have methods suitable for all ranges of deviation from the kinetic steady state. A method is proposed which has been shown to be useful in extensive calculations whose results have been published elsewhere. Tests used as evidence for the validity of the procedure are discussed. The minimum detailed description required for general use is given. (Author)

**AD-622 743 Div. 10/7 ,9/1 ,4/4**
*NEW YORK UNIV N Y DEPT OF CHEMISTRY*
**A THEORETICAL ANALYSIS OF CHEMICAL AND PHYSICAL PROCESSES IN AN OZONE FLAME,**
by Edwin S. Campbell. 1965, 20p. Contract AF49 638 169
AFOSR , 65-1476

Unclassified report

Pub. in Chemical Engineering Science v20 p311-29 1965 (Copies available only to DDC users).

Descriptors: (*Ozone, Flames), (*Flames, Fluid dynamic properties), Mathematical models, Thermodynamics, Numerical methods, Theory, Reaction kinetics

New theoretical solutions of the one-dimensional time independent hydrodynamic equation for an ozone flame are reported. Marked differences in comparison with previous solutions are shown to be the result of removing some approximations. The solution curves are analyzed to permit discussion of the following topics: (1) the eigenvalue character of the problem; (2) the treatment and significance of deviations from the kinetic steady-state; (3) the qualitative character of free-radical curves; (4) the role of radical recombination; (5) the relative importance of different processes of energy transport; (6) the use of the approximation of constant specific enthalpy; (7) the relative importance of heat-release by radical recombination; (8) the spatial separation of flame processes; (9) the role of diffusion; (10) the significance of kinetic energy of overall gas-flow; (11) the use of theoretical analysis of flames as a means of studying high temperature reactions. (Author)

**AD-622 897 Div. 10/7 ,4/4**
*LOUVAIN UNIV (BELGIUM) LAB OF INORGANIC CHEMISTRY*
**CONSIDERATIONS ON THE THEORETICAL EXISTENCE OF FUNDAMENTAL FLAMMABILITY LIMITS IN GASEOUS MIXTURES,**
by A. van Tiggelen, and J. Burger. Oct 64, 2p. Contract AF EOAR42 63
AFOSR , 65-1427

Unclassified report

Pub. in Combustion and Flame v8 n4 p343-4 Dec 1964 (Copies available only to DDC users).

Descriptors: (*Flammability, Theory), (*Flame propagation, Theory), Gases, Combustion, Burning rate, Thermochemistry, Belgium

Flame (chain) propagation theory is employed as the basis for the derivation of a criterion which predicts flammability limits in gaseous mixtures and, also, the intrinsic condition for non-flammability.

**AD-622 363** **See Fld. 21/5**

**AD-622 582** **See Fld. 21/8**

**AD-622 751** **See Fld. 7/4**

**AD-622 842** **See Fld. 19/4**

**AD-622 906** **See Fld. 7/4**

**AD-622 923** **See Fld. 7/4**

**AD-623 014** **See Fld. 7/3**

## 21/4. FUELS

**AD-622 470 Div. 10/2 ,4/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**DEVELOPMENT OF UKRAINIAN PETROLEUM CHEMISTRY PRESENT SCOPE AND ACCELERATED TEMPOS,**
by P. Zherdetskii. 24 Sep 65, 11p. Rept. no. FTD-TT-65-679
TT , 65-64195

Unclassified report

Unedited rough draft trans. of Pravda Ukrainy (USSR) 28 Jul p2 1964.

Descriptors: (*Petroleum industry, USSR), Refineries, Construction, Chemistry

**AD-622 937 Div. 10/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**COMPOSITION OF T-5 FUEL: REVIEW ARTICLE.**
Rept. no. 27 on AID Work Assignment no. 28. 24 Mar 64, 12p. Rept. no. AID-U-64-19
TT , 65-64282

Unclassified report

Descriptors: (*Jet engine fuels, USSR), Physical properties, Chemical properties, Hydrocarbons, Viscosity, Pyrolysis, Combustion, Specifications, Reviews

The report is to present the latest data on the composition and possible origin of the Soviet T-5 jet fuel and to evaluate these data. The fuel is defined as that of gas oil type, basically designed for supersonic aircraft. A reported source gives for the first time an exhaustive analysis of T-5 fuel, and a previously reported source is used for comparison. In the course of this comparison it was found that the physical and chemical properties of the actual analysis given in the former differ from the limit values of the specifications given in the latter. Moreover, there is also a difference between the actual composition of T-5 fuel as given in the former and in the analyses given in AD-621 874. The probable reasons for differences are discussed and evaluated.

**AD-622 384** **See Fld. 14/2**

**AD-622 942** **See Fld. 11/8**

## 21/5. JET AND GAS TURBINE ENGINES

**AD-622 363 Div. 27/2 ,10/7**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PROBLEM OF FLAME EMANATION IN LIQUID FUEL GAS TURBINE COMBUSTION CHAMBERS,**
by V. I. Antonovskii, and Ya. P. Storozhuk. 17 Sep 65, 20p. Rept. no. FTD-TT-65-858
TT , 65-64153

Unclassified report

Unedited rough draft trans. of Teploenergetika (USSR) v12 n3 p41-7 1965.

Descriptors: (*Combustion chambers, Gas turbines), (*Gas turbines, Combustion chambers), (*Flame propagation, Combustion chambers), Liquids, Fuels, Burning rate, Temperature, Distribution, Thermal stresses, Heat-resistant metals + alloys, High-temperature research

**AD-622 374 Div. 27/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**LIMITING POWER OF CLOSED-CYCLE GAS TURBINES,**
by V. I. Batishchev. 24 Sep 65, 15p. Rept. no. FTD-TT-65-626
TT , 65-64156

Unclassified report

Unedited rough draft trans. of Energomashinostroenie (USSR) v10 n4 p14-6 1964.

Descriptors: (*Gas turbines, Power), Gas turbine rotors, Crankshafts, Design, USSR, Mathematical analysis, Gas flow, Turbine parts

The effect of various factors on the magnitude of the limiting power of closed-cycle gas turbines is examined. (Author)

**AD-622 375 Div. 27/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**NOZZLE OF A JET ENGINE,**
by K. V. Shulikov. 22 Sep 65, 6p. Rept. no. FTD-TT-65-782
TT , 65-64157

Unclassified report

Unedited rough draft trans. of Russian patent 166 244, appl. 10682/350455/40-23, 18 Dec 46, 2p.

Descriptors: (*Thrust vector control systems, Turbojet exhaust nozzles), (*Turbojet exhaust nozzles, Patents), Jet engines, Design, USSR

The object of the invention is a jet engine nozzle, characterized by the fact that for the purpose of gaining the possibility of controlling the thrust vector in vertical plane, it is provided with a turning-in-vertical-plane fitting, mounted on thrust bearings and work gear coupled with drive mechanism. (Author)

**AD-622 392 Div. 27/2**
**CFSTI Prices: HC $3.00 MF $0.75**
*SUNDSTRAND AVIATION-DENVER COLO*
**EFFECT OF BACK PRESSURE ON RE-ENTRY TURBINE PERFORMANCE.**
Final rept.,
by Robert G. Adams, and James E. Mullaney. 13 Mar 64, 95p. Rept. no. CDRD-64-7033
Contract Nonr229200

Unclassified report

Descriptors: (*Turbines, Performance (Engineering)), (*Reentry vehicles, Turbines), Pressure, Design, Optimization, Reynolds number, Geometric forms, Nozzles, Turbine wheels

The intent was to investigate experimentally the influence of back pressure (Reynolds Number effect) on the stage performance and overall performance of a twostage re-entry type turbine, to analyze and correlate these data, where possible, with existing theories and to attempt a loss analysis which will separate the viscous losses from the non-viscous losses. For these tests, existing turbine hardware was to be used with only minor changes. The investigations were intended to be of exploratory nature registering the gross effects and main trends of the back pressure influence at supersonic as well as sonic approach velocities to the rotor.

**AD-622 466 Div. 27/2 ,25/8**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**COOLING THE MOVING BLADES OF GAS TURBINES WITH A LIQUID-METAL HEAT-TRANSFER AGENT,**
by L. I. Slobodyanyuk, and V. A. Omelyuk. 12 Oct 65, 16p. Rept. no. FTD-TT-65-1370
TT , 65-64191

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Energetika (USSR) v8 n3 p61-6 1965.

Descriptors: (*Gas turbine blades, Liquid metal coolants), (*Liquid metal coolants, Effectiveness), Heat transfer, Gas turbines, Mathematical analysis, Performance (Engineering), Air cooled, Evaporation, Cooling, USSR

Evaporative cooling assures high efficiency and less complexity of the working blades, as compared with air cooling. At the same time, with evaporative cooling it is necessary to replenish the water by means of a special distillation apparatus.

**AD-622 514 Div. 27/2 ,7/5**
**CFSTI Prices: HC $4.00 MF $1.00**
*GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER*
**INVESTIGATION OF WATER AND STEAM AS THE WORKING FLUIDS IN A FLUID AMPLIFIER SPEED GOVERNOR FOR TURBINE GENERATOR SETS.**
Final rept.
1965, 138p. Contract Nonr400100

Unclassified report

Descriptors: (*Generators, Fluid flow), (*Gas turbines, Generators), (*Fluid flow, Control devices), (*Speed regulators, Generators), Circuits, Steam turbines, Design, Water, Steam, Incompressible flow, Steam valves, Amplifiers

The dynamic requirements of a steam-operated actuator for the steam valve can be satisfied with fluid amplifier circuits by the use of high gain feedback circuits. The efficiency compares favorably with electromechanical hydraulic systems. Present 'state-of-theart' in fluid circuit technology limits the minimum actuator area to approximately 20 sq. in. for a 70 rad/sec. closed-loop bandwidth on the actuator stage. The practical problems associated with the actuator are the primary obstacles to the mechanization of the actuator stage. (Author)

**AD-623 086 See Fld. 20/1**

## 21/6. NUCLEAR PROPULSION

**AD-622 352 Div. 21/5**

**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**NUCLEAR ROCKET ENGINE,**
by A. P. Ermakov, and A. G. Syrmai. 12 Oct 65, 13p. Rept. no. FTD-TT-65-943
TT , 65-64143

Unclassified report

Unedited rough draft trans. of mono. Atomnaya Energiya i Transport, Moscow, 1963 p114-21. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Spacecraft nuclear propulsion, Rocket motors), (*Rocket motors, Spacecraft nuclear propulsion), (*Nuclear propulsion, Reviews), Electric propulsion, USSR, Thrust

A general discussion is presented on the applications of nuclear propulsion systems, and spacecraft systems, in particular.

**AD-622 825 See Fld. 20/13**

## 21/7. RECIPROCATING ENGINES

**AD-622 378 Div. 27/4 ,22/13,25/8**
*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF*
**EXPERIMENTAL INVESTIGATION OF A ONCETHROUGH COAXIAL STEAM GENERATOR,**
by H. E. Karig, D. N. Jackley, and L. G. Hidde. 13 Oct 64, 9p. Rept. no. NOTS-TP-3922
Proj. RUTO3H245 216 1F008 06 002
NAVWEPS , 8966

Unclassified report

Pub. in Journal of Spacecraft and Rockets v2 n3 p405-10 May-Jun 1965 (Copies not available to DDC or Clearinghouse customers). Prepared for presentation as preprint 64-468 at AIAA Annual Meeting (1st), Washington, D. C., 29 Jun-2 Jul 64.

Descriptors: (*Heat exchangers, Heat transfer), (*Gas generating systems, Heat transfer), (*Underwater propulsion, Steam turbines), (*Torpedo turbines, Underwater propulsion), Propellants, Torpedoes, Boiling, Tests

Tests were conducted on a straight-tube coaxial heat exchanger to determine heat-transfer rates for the generation of superheated steam from heat supplied by a solid-propellant, hot-gas generator. Superheated steam at 1600F and 1500 psia was generated by hot gas at 2200F that was introduced into a coaxial counterflow tube-in-tube heat exchanger. Repeated runs were made without burnout or noticeable decrease in heat-transfer efficiency. Stable equilibrium conditions were obtained within 60 sec, and sufficient steam was generated from cold water within 10 sec to provide partial power for a steam-turbine powerplant. Over-all heat-transfer rates were determined for superheat, boiling, and preheat regions at high heat flux and large temperature differences. Experimental results were in satisfactory agreement with heat-transfer calculations for forced convection inside tubes. Average heat-transfer rates of over 250,000 Btu/hr-sq ft were obtained for both steam and hot gas, with local rates as high as 850,000 Btu/hr-sq ft at a mass velocity of 1,500,000 lb/hr-sq ft and a Reynolds number of 1,000,000. (Author)

**AD-622 455 Div. 27/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PRESSURE REGULATOR OF CENTRIFUGAL PUMPS,**
by L. S. Arinushkin, R. B. Abramovich, A. V. Andreyeva, and V. A. Chvanov. 21 Sep 65, 5p. Rept. no. FTD-TT-65-775
TT , 65-64180

Unclassified report

Unedited rough draft trans. of Russian patent 159 068, appl. 828063/40-23, 30 Mar 63, 2p.

Descriptors: (*Pressure regulators, Centrifugal pumps), (*Centrifugal pumps, Pressure regulators), Fuel systems, Aircraft engines, Damping, Valves, Pistons, Patents, USSR

The invention pertains to pressure regulators of centrifugal pumps for fuel systems of aircraft engines. It includes a throttle valve of conical profile, a discharge valve and damping device in form of a piston, and an under spring membrane connected with connecting rod of the valves.

## 21/8. ROCKET MOTORS AND ENGINES

**AD-622 524 Div. 27/3 ,4/4**
**CFSTI Prices: HC $3.00 MF $0.75**
*REACTION MOTORS DIV THIOKOL CHEMICAL CORP DENVILLE N J*
**RESEARCH STUDY OF LIGHT EMISSION CAUSED BY PRESSURE FLUCTUATIONS IN ROCKET ENGINES.**
Final rept. for Jan-31 Dec 64,
by B. Hornstein. May 65, 76p. Rept. no. RMD-5516-F
Contract AF49 638 1279
AFOSR , 65-1208

Unclassified report

Descriptors: (*Rocket motors, Emissivity), (*Spectra (Visible + ultraviolet), Combustion), Pressure, Light, Physical chemistry, Reaction kinetics

Simultaneous high frequency measurements of light emission and pressure were made in an oscillating premixed methane-air, 3 inch i. d. x 16 inch long rocket engine at pressures from 50 to 150 psig. Using filtered photomultiplier tubes, emission in the OH (0,0) band (3064A), the CH (0, 0) band (4315A), and total luminosity (CO + O = CO2 + photons) over the range of the 1P28 phototube were monitored. Depending on injector arrangement, longitudinal oscillations of nominally 1150 cps and transverse oscillations of mainly 7100 cps and 14,000 cps (1st tangential and 1st radial) were encountered. With transverse oscillations, no corresponding emission fluctuations were observed, which may be owed to the aspect angle of the detectors, 90 degrees to the engine axis (0 degrees to the plane or pressure propagation). The longitudinal pressure oscillations were always accompanied by emission fluctuations of the same frequency. Emission from the chain-branching radicals OH and CH lagged the pressure by about .2 milliseconds except at 150 psig where the lag was zero. At 50 and 100 psig, the total luminosity was in phase with pressure. Visible spectra were photographically recorded, and showed similarity to previous laboratory spectra of flames as a function of pressure.

**AD-622 527 Div. 27/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*ATOMICS INTERNATIONAL CANOGA PARK CALIF*
**AFOSR CONTRACTORS' MEETING ON ION AND PLASMA PROPULSION RESEARCH (8TH) LOS ANGELES, CALIFORNIA, APRIL 29 AND 30, 1965.**
Summaries of research.
30 Apr 65, 43p. Rept. no. AI-65-77
Contract AF49 638 1222
AFOSR , 65-1266

Unclassified report

Descriptors: (*Plasma engines, Symposia), (*Ion engines, Symposia), Abstracting, Plasma medium, Magnetohydrodynamics, Electric propulsion

A bibliography of research, including abstracts, is given on ion and plasma propulsion research.

**AD-622 582 Div. 27/3 ,10/7 ,4/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*INSTITUTO NACIONAL DE TECHNICA AEROESPACIAL MADRID (SPAIN)*
**AFOSR CONTRACTORS' MEETING ON CHEMICAL KINETICS OF PROPULSION (5TH), HELD AT MADRID, SPAIN, 2-4 SEPTEMBER 1964.**
1964, 50p. Contract AF EOAR43 63
AFOSR , 65-1268

Unclassified report

Descriptors: (*Rocket propulsion, Reaction kinetics), (*Reaction kinetics, Symposia), Rocket propellants, Combustion, Spain

Summaries are given of the 22 papers presented at the meeting.

**AD-622 606 Div. 27/3**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**PROGRAMMING OF THRUST IN A CENTRAL GRAVITATIONAL FIELD,**
by A. I. Lure. 28 May 65, 53p. Rept. no. FTD-MT-65-124
TT 65-64243

Unclassified report

Edited machine trans. of an unidentified Russian article, pub. 1965 p1-60. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Thrust, Boundary value problems), USSR, Gravity, Vector analysis, Moments, Differential equations, Mathematical programming, Spacecraft, Functions

A review is given of methods of reducing the MayerBolza variational problem to a boundary value problem for a system of nonlinear differential equations. Possibilities of lowering the order of this system by means of use of its first integrals are indicated. Cases of motion in planar and spherical orbits are considered. The first section contains equations of motion and conditions of stationarity for three types of thrust devices. In the second section it is shown that use of scalar and vector integrals of these equations leads the search for the Lagrange vector to a first order differential equation, one integral of which is known. Criteria of classification of types of motions are formulated with the help of constant vector in this differential equation. Introduced into consideration are orbital axes, and recording of differential equations of the problem is given in these axes.

**AD-622 607 Div. 27/3 ,10/5**
**CFSTI Prices: HC $3.00 MF $0.75**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**DYNAMIC PROCESSES IN A LIQUID PROPELLANT ROCKET ENGINE (CHAPTER III),**
by E. K. Moshkin. 16 Sep 65, 84p. Rept. no. FTD-MT-65-104
TT , 65-64244

Unclassified report

Edited machine trans. of mono. Dinamicheskie Protsessy v Zhrd, Moscow, 1964 p170-251. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Rocket motors (Liquid propellant), Dynamics), Design, Operation, Combustion chambers, Turbopumps, Engine starters, Circuits, Hydraulic systems, Performance (Engineering), Data processing systems, Digital computers, USSR

Contents: Characteristic designs of engines and possible variants of the sequence of their operation; Character of relation between parameters of chamber and parameters of circuits; Investigation of relation between averaged parameters and dynamic processes by method of small finite deviations; Use of computer techniques in the investigation of rocket engines.

**AD-622 672 Div. 27/3**
*GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF SPACE SCIENCE LAB*
**ROCKET MOTOR WITH ELECTRIC ACCELERATION IN THE THROAT,**
by Jan Rosciszewski. 24 Jul 64, 5p. Contract AF49 638 1357 Proj. 9752 Task 975201
AFOSR , 65-1437

Unclassified report

Pub. in Journal of Spacecraft and Rockets v2 n2 p278-80 Mar-Apr 1965 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Electric propulsion, Rocket motors), (*Rocket motors, Electric propulsion), Ion engines, Acceleration, Differential geometry, Space propulsion

A rocket motor with an electric accelerator in the throat which is capable of specific impulses on the order of 1000 to 2000 is examined. Equations defining the flow are developed assuming 1-dimensional flow at low magnetic Reynolds number. It is found that the electric field at the critical section cannot be too large as there are two opposing effects: gas acceleration due to Lorentz force and heat generation due to joule heating. Using the isentropic flow relations the maximum velocities are calculated for K = 0, 0.1 and 0.5 and are found to be 3.6, 4.47, and 8.7 respectively. (Author)

**AD-622 838 Div. 27/3 ,10/5**
*POLYTECHNIC INST OF BROOKLYN FARMINGDALE N Y PROPULSION RESEARCH LAB*
**PRESSURE GRADIENTS IN A LIQUID PROPELLANT ROCKET MOTOR.**
Revised ed.,
by William T. Peschke, and Sanford S. Hammer.
1 May 64, 5p. Contract AF AFOSR86 63 Proj. 9711 Task 971101
AFOSR , 65-1478

Unclassified report

Pub. in AIAA Journal v2 n8 p1467-9 Aug 1964 (Copies not available to DDC or Clearinghouse customers). Revision of manuscript submitted 25 Mar 64.

Descriptors: (*Rocket motors (Liquid propellant), Pressure), Analysis of variance, Injectors, Evaporation, Combustion chambers, Liquid rocket propellants, Stability, Heat transfer, Fluid flow

The characteristic gradients or signatures produced by various injectors are important parameters in determining the stability or instability of a thrust chamber system. In this report various injectors are tested and data presented both as pressure vs axial distance and pressure gradient vs the average axial distance over which the gradient was computed. The data can be used to establish design criteria for steady-state operation and to predict critical conditions that can exist because of large pressure gradients that result in high heat-transfer rates to the injector face or rocket chamber wall. (Author)

**AD-622 958 Div. 27/3 ,26/6**
**CFSTI Prices: HC $3.00 MF $0.75**
*AEROJET-GENERAL CORP SACRAMENTO CALIF*
**HYDROSTATIC COMBUSTION SEAL DEMONSTRATION FEASIBILITY PROGRAM.**
Progress rept. no. 1 for 7 Mar-15 Sep 65.
15 Oct 65, 86p. Rept. no. 10784-Q-1 ,2981T
Contract AF04 611 10784

Unclassified report

Descriptors: (*Seals (Stoppers), Hydrostatics), (*Rocket motors, Seals (Stoppers)), Fuel seals, Rotary seals, Rocket propellants, Test

equipment, Oxidizers, Combustion products, Control systems, Combustion, Temperature, Liquid rocket propellants, Design, Analysis, Feasibility studies

The major objective of the program is the design of a seal for use in an oxidizer-rich atmosphere at 1200F and 3000 psi with a turbine-shaft operating speed of 40,000 rpm. Additional objectives include: (1) design and fabrication of testers and components in which this seal can be tested, (2) fabrication of test seals, (3) water tests at reduced speed and pressures, and (4) hot testing (under reduced pressure) of a thin static cross section of the seal. During the reporting period, analysis and design of a prototype combustion seal was completed and fabrication begun. Several alternative concepts were also evaluated. Testers for both hydraulic and hot conditions were designed and fabrication substantially completed. A tester for hot testing was fabricated and 12 tests were conducted; photographs of combustion characteristics of a small segment of the seal (2D tests) were also taken. (Author)

**AD-622 673 See Fld. 20/3**

## 21/9.1 LIQUID ROCKET PROPELLANTS

**AD-622 334 Div. 10/5 ,20/3**
**CFSTI Prices: HC $1.00 MF $0.50**
*NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF*
**THE RADIOLYTIC DECOMPOSITION OF 1,1DIMETHYLHYDRAZINE, DIETHYLENETRIAMINE AND HYDYNE ROCKET FUELS,**
by Wesley E. Shelberg. 19 Aug 65, 18p. Rept. no. USNRDL-TR-896
Proj. SR011 01 01 Task 0401
Unclassified report

Descriptors: (*Liquid rocket fuels, Decomposition), (*Dimethyl hydrazine (1-1), Radiochemistry), (*Amines, Liquid rocket fuels), Storage, Radiation damage, Gamma rays, Free radicals, Inhibition, Stabilization, Gas analysis, Space environmental conditions, Spacecraft nuclear propulsion

One hundred-milliliter samples of the storable liquid rocket fuels, 1,1-dimethylhydrazine, diethylenetriamine, and Hydyne generate respectively 199.0, 101.2 and 164.1 ml of radiolytic off-gas (measured at 25C and 1 atm) when irradiated to 8,500,000 rads with gamma rays. The result for Hydyne was calculated from those for 1, 1-dimethylhydrazine and diethylenetriamine, Hydyne consisting of 60 wt-% of the former and 40 wt-% of the latter. When the samples contain 5 vol-% of the freeradical scavenger methyl methacrylate, the off-gas volumes are reduced respectively by 18.2, 11.0 and 16.7 %. Since the free-radical scavenger reduces somewhat the off-gas from the fuels due to laboratory ionizing radiation, it may be expected to improve their storability somewhat with respect to ionizing space and nuclear rocket radiations. (Author)

**AD-622 785 Div. 10/5 ,4/3**
**CFSTI Prices: HC $2.00 MF $0.50**
*NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF*
**AUTOXIDATION OF 1,1-DIMETHYLHYDRAZINE,**
by W. H. Urry, A. L. Olsen, E. M. Bens,, H. W. Kruse, and C. Ikoku. Sep 65, 43p. Rept. no. NOTS-TP-3903
NAVWEPS , 8798
Unclassified report

Descriptors: (*Dimethyl hydrazine (1-1), Oxidation), (*Oxidation, Dimethyl hydrazine), Reaction kinetics, Decomposition, Chromatographic analysis, Nuclear magnetic resonance, Nuclear spectroscopy, Organic nitrogen compounds

The autoxidation of 1,1-dimethylhydrazine I gives formaldehyde dimethylhydrazone II, nitrogen, and water as its major products. Minor ones are ammonia, dimethylamine, dimethylnitrosame, diazomethane, nitrous oxide, methane, carbon dioxide, and formaldehyde. This reaction is of first order in I and of zero order in oxygen. It is catalyzed by metals and metal salts, inhibited by added 1,3-butadiene, and accelerated by ultraviolet light. A free-radical chain mechanism is postulated as the rate-determining reaction sequency. The 1,1-dimethylhydrazyl-2-hydroperoxide so formed is presumed to give the products II, hydrazine, and hydrogen peroxide via a rapid sequency of wall reactions (established in the study of liquid-phase autoxidations of 1,1-dialkylhydrazines). Nitrogen and most minor products probably result from further wall reactions of hydrogen peroxide with I, II, and hydrazine. Autoxidations of hydrazine resemble those of hydrocarbons. (Author)

**AD-622 607 See Fld. 21/8**

**AD-622 838 See Fld. 21/8**

**AD-622 923 See Fld. 7/4**

## 21/9.2 SOLID ROCKET PROPEL-

**AD-622 399 Div. 10/6**
**CFSTI Prices: HC $3.00 MF $0.75**
*BATTELLE MEMORIAL INST COLUMBUS OHIO*
**DEVELOPMENT OF LAMINATED SOLID PROPELLANTS.**
Final technical rept. for 15 Apr 61-30 Nov 63,
by A. Rudnick, R. W. King, J. Harp, D. H. Fisher, and B. Bennett. 30 Nov 63, 56p. Rept. no. G-4890-1
Contract Nonr350600 Proj. NR064-459
Unclassified report

Descriptors: (*Propellant grains, Laminates), (*Solid rocket propellants, Reinforcing materials), Plastics, Metals, Tests, Mechanical properties, Combustion, Tensile properties

The concept of reinforcement of a solid-propellant grain through use of combustible metal or plastic laminates is discussed. Procedures used for preparing test samples for mechanical-property studies and firing tests are described. Mechanical strength was found to be increased generally in proportion to the amount of reinforcement added. Firing tests demonstrated clearly that the orientation of the reinforcement layers parallel to the combustion surface is not compatible with satisfactory combustion, whereas, when the reinforcement is oriented normal to the combustion surface, burning is either enhanced or unchanged. (Author)

**AD-622 649 Div. 10/6 ,20/3**
*RADIATION APPLICATIONS INC LONG ISLAND CITY N Y*
**EFFECT OF RADIATION ON AMMONIUM PERCHLORATE PROPELLANTS,**
by T. Acker, E. Henley, R. F. McAlevy,III, AND G. Odian. 11 Mar 64, 3p. Contract AF49 638 1125 Proj. 9751 Task 975101
AFOSR , 65-1435
Unclassified report

Pub. in AIAA Journal v2 p1165 Jun 1964 (Copies not available to DDC or Clearinghouse customers).

Descriptors: (*Solid rocket propellants, Radiation damage), (*Ammonium compounds, Perchlorates), (*Radiation damage, Propellants), Electron bombardment, Burning rate, Tensile properties

The results of a series of experiments conducted to determine the effects of radiation on ammonium perchlorate propellants are presented. The propellant strands were irradiated with a 2-mev Van de Graaff electron accelerator. After exposure to doses from 0-50 mrad, burning rates and tensile measurements were made. It was demonstrated that in many cases, drastic changes in burning rates and tensile strengths occurred upon radiolysis. (Author)

## 22. SPACE TECHNOLOGY

**AD-622 360 Div. 12/6 ,12/2**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**ON THE ORIENTATION OF ARTIFICIAL EARTH SATELLITES,**
by E. F. Fatkhullin. 8 Oct 65, 21p. Rept. no. FTD-TT-64-756
TT , 65-64150
Unclassified report

Unedited rough draft trans. of Universitet Druzhby Narodov, Moscow. Trudy (USSR) v1 n1 p71-86 1963.

Descriptors: (*Satellites (Artificial), Stabilization), Orbital trajectories, Guidance, Motion, Moment of inertia, Gyroscopes, USSR

The present paper is devoted to the study of the stability of a given satellite-orientation in free space. The control elements are three reaction-wheels. The investigation is based on Lyapunov's second method. The equations of distributed motion are derived, the Lyapunov function is constructed, the sufficient conditions of stability of the undistrubed motion are found, and the region of initial perturbations is determined.

**AD-622 383 Div. 12/6 ,12/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**CLASSIFICATION OF ORBITAL ORIENTATION SYSTEMS OF ARTIFICIAL EARTH SATELLITES,**
by E. N. Tokar, and V. N. Branets. 1965, 16p. Rept. no. FTD-MT-65-180
TT , 65-64160
Unclassified report

Edited machine trans. of an unidentified Russian article, p1-13 pub. 1965.

Descriptors: (*Satellites (Artificial), Stabilization), (*Orbital trajectories, Satellites (Artificial)), Gyroscopes, Space navigation, USSR, Guidance

**AD-622 386 Div. 12/6 ,12/1**
**CFSTI Prices: HC $6.00 MF $1.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**COSMIC RESEARCH, VOL. 3, NO. 4, 1965.**
18 Oct 65, 281p. Rept. no. FTD-TT-65-1262
TT , 65-64163
Unclassified report

Unedited rough draft trans. of Kosmicheskie Issledovaniya (USSR) v3 n4 p507-663 1965.

Descriptors: (*Astronautics, USSR), Periodicals, Interplanetary trajectories, Space propulsion, Boundary value problems, Orbital trajectories, Scientific satellites, Radiation measurement system, Space communication systems, Ionosphere, Electron density, Extraterrestrial radio waves

**AD-622 443 Div. 12/6 ,12/1 ,16/1**
**CFSTI Prices: HC $6.00 MF $1.25**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*

**AN ANALYSIS OF THE INERTIAL PROPERTIES AND PERFORMANCE OF THE ASTRONAUT MANEUVERING SYSTEM.**
Master's thesis,
by Julius Anthony Tieber, and Robert Walter Lindemuth. Aug 65, 250p.

Unclassified report

Descriptors: (*Astronauts, Maneuverability), (*Propulsion, Astronauts), Anthropometry, Mathematical models, Biophysics, Center of gravity, Performance (Human), Pressure suits, Posture, Life support, Thrust, Attitude control systems, Automatic, Programming (Computers), Programming languages, Design, Tables

To predict the system performance in space, the inertial properties of the Astronaut Maneuvering System (AMS) were determined. An existing mathematical model of the human body was revised and improved on the basis of improved regression equations and additional anthropometric dimensions. A mathematical model of a space suit was designed on the basis of measurements of suited subjects and suit weight regression equations. These models were combined into a model of a suited body. A computer program calculated the inertial properties of this model and compared them with experimental data. Results indicated the following: (1) Horizontal accelerations are more efficient than vertical accelerations; (2) The effects of inertial cross-coupling cause considerable loss of efficiency in roll and yaw maneuvers; (3) System performance is better with smaller astronauts, not just because of inherently higher accelerations, but also higher efficiency factors; (4) Variations in attitude deadband width have no significant effect on performance; (5) Inertial cross-coupling and center of gravity and line-of-thrust misalignment will make attitude control difficult while performing maneuvers in the manual control mode. (Author)

**AD-622 463 Div. 12/6 ,12/1**
**CFSTI Prices: HC $1.00 MF $0.50**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**OUTER SPACE AND CYBERNETICS,**
by A. Prokhorov, and I. Zakharov. 20 Sep 65, 8p. Rept. no. FTD-TT-65-1147
TT , 65-64188

Unclassified report

Unedited rough draft trans. from Zarya Vostoka (USSR) 18 Aug 1p 1962.

Descriptors: (*Cybernetics, Space communication systems), Space flight, Data processing systems, Computers, Astronauts, USSR

**AD-622 478 Div. 12/6 ,12/2 ,2/4**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**APL COORDINATE SYSTEMS AND THEIR RELATION TO ONE ANOTHER,**
by F. T. Heuring. 3 Aug 64, 18p. Rept. no. CF-3100
Contract NOw62 0604c

Unclassified report

Descriptors: (*Geodesics, Inertial guidance), (*Orbital trajectories, Geodesics), (*Tracking, Satellites (Artificial)), Astronomical geodesics

Coordinate systems used by APL are an inertial coordinate xed geodetic coordinate system. The inertial coordinate systems is that one in which the satellite is tracked and ephemerides computed; this is described in Section I. The earth-fixed geocentric coordinate system furnishes the 'tie' between the satellite in inertial space and the tracking station of the rotating Earth, and is discussed in Section II. The tracking stations are specified in some geodetic coordinate system which in turn is related to the earth-fixed geocentric coordinate system and is covered in Section III.

**AD-622 481 Div. 12/6 ,12/1 ,30/2 ,7/5**
**CFSTI Prices: HC $3.00 MF $0.75**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**ELECTRONIC ANALOG SIMULATION OF SATELLITE THERMAL AND POWER SYSTEM CHARACTERISTICS,**
by R. M. Vernon. 15 May 64, 60p. Rept. no. CF-3087
Contract NOw62 0604c

Unclassified report

Descriptors: (*Satellites (Artificial), Simulation), (*Analog computers, Simulation), Thermal properties, Power supplies, Solar panels, Solar cells, Current regulators, Storage batteries

Those parameters are determined in the thermal and power system design that adversely affect the operation of the charge regulator system of an orbiting satellite. Because of the extensive systems evaluation which was required to obtain this objective, a major out-growth of this study was the generation of an electronic analog method of satellite performance simulation which may be applied to both satellite systems design and orbital evaluation. Initially simple models of the charge regulator system were chosed for analytical evaluation by hand and digital computer calculations. These methods were found to be inadequate due to both the simplicity of assumed models and the length of time required for calculations. A description is presented of the satellite design characteristics which were simulated, the method of simulation and the results of a parametric study of satellite operation under various conditions.

**AD-622 483 Div. 12/6 ,12/2 ,7/5**
**CFSTI Prices: HC $1.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**EFFECTS OF PASSIVE ATTITUDE CONTROL ON SOLAR POWER SYSTEMS,**
by Robert E. Fischell. 5 May 64, 17p. Rept. no. CF-3077
Contract NOw62 0604c

Unclassified report

Descriptors: (*Solar cells, Attitude control systems), (*Attitude control systems, Solar cells), Spacecraft, Satellites (Artificial), Power supplies, Stabilization, Orbital trajectories, Solar radiation, Spin, Terrestrial magnetism, Gravity

There is a strong relationship between a spacecraft's attitude control system and its capacility for generating electrical power from solar cells. The effects of four particularly interesting passive attitude control techniques on the spacecraft's solar power system are discussed. These four techniques are: solar stabilization, spin stabilization, magnetic stabilization, Gravity Gradient Stabilization.

**AD-622 484 Div. 12/6 ,12/1**
**CFSTI Prices: HC $3.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**SATELLITE BOOST PHASE HEATING,**
by R. M. Vernon. 12 Mar 64, 54p. Rept. no. CF-3076
Contract NOw62 0604c

Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Heat shields), (*Satellites (Artificial), Heating), Heat transfer, Aerodynamic heating, Payload, Ejection, Thermal radiation, Staging, Trajectories

An analytical and experimental study of boost phase heating of satellite 1963 22A has been accomplished. Two stages of heating were considered: (1) Radiative and convective heat transfer between heat shield and payload, and (2) Direct aerodynamic heating after heat shield ejection. The results show that a maximum temperature rise possible on any portion of the payload is 38 degrees F before heat shield ejection and about 240 degrees F after heat shield ejection. However, the latter temperature rise is highly localized and the associated heat input is easily accommodated by the payload without any perceptible overall temperature increase. It was concluded that, for the contemplated boost trajectory, no serious heating of the satellite would be encountered. (Author)

**AD-622 486 Div. 12/6 ,12/1 ,13/4**
**CFSTI Prices: HC $2.00 MF $0.50**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**SOLAR DIFFERENTIAL HEATING OF THIN WALL BOOMS IN NEAR EARTH ORBIT,**
by J. E. Kummerer. 1 Apr 64, 34p. Rept. no. CF-3073
Contract NOw62 0604c

Unclassified report

Descriptors: (*Extendable structures, Scientific satellites), (*Solar radiation, Cylindrical bodies), (*Cylindrical bodies, Solar radiation), Thermal radiation, Heat, Structural shells, Thermal stresses, Space environmental conditions, Radio astronomy, Antennas, Mathematic analysis, Structures

Thin walled cylinders exposed to sunlight in space can develop a relatively large circumferential temperature gradient, which in turn gives rise to relatively large thermoelastic stresses in the cylinder wall. A proposed Radio Astronomy Satellite would use an extendable boom of 1000 feet in length, erected by unwinding a reel of preformed Beryllium copper tape, as an antenna. A relatively large circumferential temperature gradient will produce elongations which, acting over this 1000 foot length, can produce very large end deflections. Before any rigorous structural analysis can be undertaken, a thorough knowledge of the temperature gradients to be expected for the various configurations under consideration is necessary. This report presents the analysis and results obtained to date, of thin walled cylinders in near earth orbit.

**AD-622 494 Div. 12/6 ,12/1 ,30/2 ,12/3**
**CFSTI Prices: HC $2.00 MF $0.75**
*JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB*
**SATELLITE TELEMETRY DATA PROCESSOR,**
by Algimantas A. Dargis. 3 Oct 63, 43p. Rept. no. CF-3052
Contract NOw62 0604c

Unclassified report

Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Satellites (Artificial), Checkout equipment), (*Test equipment (Electronics), Astronautics), (*Astronautics, Data processing systems), (*Data processing systems, Astronautics), Ground support equipment, Checkout procedures, Launching, Spacecraft, Telemeter systems, Malfunctions, Monitors, Display systems

This report deals with the ideas behind the design and operation of the APL Satellite Telemetry Data Processor designed by SSD-1 for use as test equipment during the satellite checkout, launch and early orbit operations. The Processor takes an input of PAM (Pulse Amplitude Modulation), PDM (Pulse Duration Modulation), and PCM (Pulse Code Modulation) information and prepares it for print-out, further processing, or display by means of lights, automatically finding bit and frame synchronization. The unit was designed during the summer of 1962 and it has been used with four different satellites. One of these satellites is the S-66. The accuracy of the PAM print-out is usually better than one per cent when used within the telemetry system, which includes a radio link. (Author)

**AD-622 605 Div. 12/6 ,12/2**
*FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO*
**A CLASS OF ATTITUDE-CONTROL SYSTEMS OF ARTIFICIAL EARTH SATELLITES,**
by V. A. Bodner, K. B. Alekseev, and G. G. Bebenin. 3 Jun 65, 24p. Rept. no. FTD-MT-65-119
TT , 65-64242

Unclassified report

Edited machine trans. of an unidentified Russian article, pub. 1965 p1-29. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is not available for public sale.

Descriptors: (*Attitude control systems, Satellites (Artificial)), (*Satellites (Artificial), Attitude control systems), Satellite attitude, Synthesis, Magnetic drives, Flywheels, USSR

The report is concerned with the synthesis of circuits of control systems with flywheels and of those with momentum magnetic drive.

**AD-622 694 Div. 12/6 ,12/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*AEROSPACE INFORMATION DIV LIBRARY OF CONGRESS WASHINGTON D C*
**SPACECRAFT UTILIZING THE LIFTING REENTRY TECHNIQUE. PART I. REENTRY AND RECOVERY OF THE SOVIET MANNED SPACE VEHICLES: COMPREHENSIVE ANALYSIS.**
AID Work assignment no. 52.
18 Feb 64, 92p. Rept. no. AID-U-64-7
TT , 65-64246

Unclassified report

Based on Soviet and Soviet Bloc open literature. Available copy will not permit fully legible reproduction. Reproduction will be made if requested by users of DDC. Copy is available for public sale.

Descriptors: (*Reentry vehicles, Reviews), (*Manned spacecraft, USSR), Atmospheric entry, Recovery, Orbital trajectories, Spacecraft, Structural properties, Reliability, Space navigation, Retro rockets, Shock waves, Atmospheric heating, Deceleration, Ablation, Sublimation, Cooling, Landings, Astronauts, Command + control systems, Lunar craft

Contents: Brief discussion and analyst's conclusions and conjectures; General data on the structure of Vostok-type spaceships; Descent of a spaceship from orbit to the sensible atmosphere; Descent of a spaceship through the sensible atmosphere; Protection of aerospace vehicles from overheating; Landing systems; Lunar flights.

**AD-622 812 Div. 12/6 ,12/2**
**CFSTI Prices: HC $7.10 MF $2.00**
*WESTINGHOUSE DEFENSE AND SPACE CENTER BALTIMORE MD AEROSPACE DIV*
**GROUND CONTROL OF ADVANCED SPACE VEHICLE.**
Final rept. for 15 May 64-30 Jun 65,
by J. Braumiller, J. Miller, L. Hart, H. Dittmar, and H. Alatalo. Sep 65, 409p. Rept. no. 5207A
Contract AF30 602 3386 Proj. 4519 Task 451901
RADC , TR-65-255

Unclassified report

Descriptors: (*Satellite attitude, Control systems), (*Communication satellites (Passive), Satellite attitude), (*Solar sails, Attitude control systems), Space communication systems, Satellites (Artificial), Maneuvering satellites, Inclined orbit trajectories, Elliptical orbit trajectories

The feasibility is explored of controlling the orbits and orbit positions of satellites of large area-to-mass ratio by radiation pressure. An orbit maneuvering technique was specified that would enable control of the relative spacings of a group of satellites, including equally distributed placement from a single launcher and subsequent routine corrections. Control is effected by occasional rotations about one axis to change the angle of a surface pattern relative to the velocity vector. The pattern is a sail with reflectivities on its two sides different. A system for determining optimum commands and command times for a group of satellites was determined. Performance of the method was evaluated for a variety of satellite sizes, altitudes, orbit inclinations, orbit eccentricities, and other parameters. A functional plan was prepared for the single ground station which controls the system. The attitude control of an antenna pointing satellite was studied. This communications satellite is required to aim toward two or more points on earth in succession. One or both points may be capable of transmitting, and sensing schemes have been developed for both cases. The accuracy and dynamic performance of a reaction wheel torquing system has proven satisfactory in digital computer simulations.

**AD-622 991 Div. 12/6 ,12/2 ,15/1**
**CFSTI Prices: HC $3.00 MF $0.75**
*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING*
**APPLICATION OF LINEAR OPTIMAL CONTROL THEORY TO THE FLEXIBLE BOOSTER.**
Master's thesis,
by Bruce Lee Solomon. Aug 65, 93p. Rept. no. GE/EE/65-24

Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Control systems), (*Optimization, Control systems), Linear systems, Flexible structures, Booster motors, Flight control systems, Models (Simulations), Feedback, Stability, Aeroelasticity

A brief development of concepts and mathematics involved in frequency plane optimization, using a least integral error square with quadratic constraint performance index, is presented. The technique is applied to the problem of controlling a hypothetical flexible booster with quadratic constraint on the control. Problems arise from a RHP zero in the model of the booster. Results agree with results using conventional methods. Realizable compensation to yield a stable system could not be found. In contrast to conventional methods, this optimization technique allows precise solution. Trail and error and experience factors are minimized. Comparison with state space optimization shows frequency plane techniques superior in single input problems. (Author)

**AD-623 081 Div. 12/6 ,12/5**
**CFSTI Prices: HC $2.00 MF $0.50**
*AEROSPACE CORP SAN BERNARDINO CALIF*
**PREDICTION OF RE-ENTRY VIBRATION,**
by Frank A. Smith, and F. J. Benedetti. Sep 65, 32p. Rept. no. TDR-669 (S6810-21)-1
Contract AF04 695 669
BSD- , TR-65-453

Unclassified report

Descriptors: (*Reentry vehicles, Vibration), Broadband, Launch vehicles (Aerospace), Boundary layer, Boundary layer transition, Acoustics, Noise, Low frequency, Ablation, Atmosphere entry

The underlying problem in the prediction of reentry vibrations is the fundamental question regarding the effectiveness of the boundary layer noise to produce structural vibrations, particularly during flight at velocities up to Mach 20. Although the pressure fluctuations in the boundary layer are thought to be larger during the re-entry period than boost, this effect is cancelled, in part, by the increased velocities which distributes the energy over a much broader frequency bandwidth (up to 100 kc). Thus, for the frequency range of interest (up to 2000 cps), the predicted vibration criteria may vary by as much as ten decibels between any two analysts, depending upon how these factors are treated. This paper presents, in nondimensional form, recent broadband vibration data which indicates a trend toward higher vibration levels during the re-entry period as compared to the boost period. The data are as yet insufficient both in quantity and quality to accurately assess the effect on vibration levels of all flight parameters (such as effects due to various ablative materials); however cursory checks of these data show that they tend to follow the dynamic pressure characteristics.

**AD-622 479 See Fld. 8/2**

How To Use Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

## SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and field/group. A typical subject index entry is shown below.

*ALUMINUM
GLASS TEXTILES
INVESTIGATION OF GLASS-METAL COMPOSITE MATERIALS
AD-619 773 FLD. 11/7

## PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Field/group and titles are also listed. Three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*CHASE, JOHN W.
* * *
THE LANTHANUM, EUROPIUM, AND DYSPROSIUM CONTENTS OF TWO TEKTITES
AD-619 828 FLD. 8/7
* * *
A PROCEDURE FOR GEOCHEMICAL INTERPRETATION OF TERRESTRIAL RARE-EARTH ABUNDANCE PATTERNS
AD-619 834 FLD. 8/7

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The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry for each document are listed the originator of the report, the originator's report number, the title, AD number, and field/group. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parenthesis directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown on the next page.

*AEROJET- GENERAL CORP AZUSA
CALIF

* * *

TR3015
STUDY OF THE REACTION
OF PENTABORANE WITH HYDRAZINE
AND SUBSTITUTED HYDRAZINES
(AFOSR 65-1058)
AD-619 513 FLD. 7/4

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC
RESEARCH WASHINGTON D C

* * *

65-1058
STUDY OF THE REACTION
OF PENTABORANE WITH HYDRAZINE
AND SUBSTITUTED HYDRAZINES
AD-619 513 FLD. 7/4

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The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and field/group.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

A contract entry may also contain a letter F, A, or S on the left-hand margin, indicating that the document is a Final, Annual, or Summary report. A typical contract entry is shown below.

*AF19 628 5167
LINCOLN LAB MASS INST OF TECH
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(ESD TDR-65-315)
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(AFCRL 69-667)
AD-622 902 FLD.20/14
SR 4
(AFCRL 69-672)
AD-622 903 FLD.20/14

•AF19 628 4800
STANFORD RESEARCH INST MENLO PARK CALIF
SR 1
(AFCRL 69-684)
AD-622 876 FLD.20/14

•AF19 628 900
LINCOLN LAB MASS INST OF TECH LEXINGTON
(ESD TDR-69-71)
AD-622 946 FLD.20/12

•AF19 628 9167
LINCOLN LAB MASS INST OF TECH LEXINGTON
JA 2916
AD-622 927 FLD.20/3
TN 1969 39
AD-622 666 FLD.17/9
TN 1969 38
AD-622 784 FLD.17/9
TN 1969 49
AD-623 017 FLD.17/9

•AF29 600 4126
MISSOURI UNIV COLUMBIA
(ARL TR-69-17)
F AD-622 938 FLD.6/3

•AF29 601 6320
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF RESEARCH LABS
4 77 69 1
(AFML TR-69-132 V1)
F AD-622 797 FLD.20/8

•AF30 602 3028
MICROWAVE ELECTRONICS CORP PALO ALTO CALIF
(RADC TR-69-260)
F AD-622 803 FLD.9/1

•AF30 602 3252
REZA (F M) SYRACUSE N Y
(RADC TR-69-134)
AD-622 829 FLD.9/4

•AF30 602 3269
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
RF 1767 2
(RADC TR-69-186 V1)
F AD-623 072 FLD.9/5
RF 1767 3
(RADC TR-69-186 V2)
F AD-623 073 FLD.9/5
RF 1767 4
(RADC TR-69-186 V3)
F AD-623 074 FLD.9/5
RF 1767 5
(RADC TR-69-186 V4)
F AD-623 075 FLD.9/5
RF 1767 6
(RADC TR-69-186 V5)
F AD-623 076 FLD.9/5
RF 1767 7
(RADC TR-69-186 V6)
F AD-623 077 FLD.9/5

•AF30 602 3344
INTERNATIONAL BUSINESS MACHINES CORP POUGHKEEPSIE N Y
(RADC TR-69-199)
F AD-622 819 FLD.9/2

•AF30 602 3386
WESTINGHOUSE DEFENSE AND SPACE CENTER BALTIMORE MD AEROSPACE DIV
9207A
(RADC TR-69-255)
F AD-622 812 FLD.22

•AF30 602 3513
THOMAS ELECTRONICS INC PASSAIC N J
(RADC TR-69-112)
F AD-622 919 FLD.9/1

•AF30 602 3946 GRANT
INFORMATION SYSTEMS LAB UNIV OF MICHIGAN ANN ARBOR
ISL 69 3
AD-622 609 FLD.12/1

•AF33 615 1089
RESEARCH LAB OF ELECTRONICS MASS INST OF TECH CAMBRIDGE
AD-622 945 FLD.10

•AF33 615 1124
RADIATION EFFECTS INFORMATION CENTER COLUMBUS OHIO
REIC AL 91
AD-622 790 FLD.18/8
80 91
AD-622 791 FLD.18/8

•AF33 615 1160
NORTHWESTERN UNIV EVANSTON ILL GAS DYNAMICS LAB
(ARL 69-172)
AD-622 795 FLD.20/3

•AF33 615 1194
REPCO INC ORLANDO FLA
(AMRL TR-69-87)
F AD-622 920 FLD.6/12

•AF33 615 1288
OWENS-ILLINOIS TECHNICAL CENTER TOLEDO OHIO
(ARL 69-140)
F AD-622 930 FLD.20/2

•AF33 615 1338
RADIO CORP OF AMERICA CAMDEN N J
(AMRL TR-69-92)
F AD-622 804 FLD.1/4

•AF33 615 1963
DENVER RESEARCH INST COLO
(AMRL TR-69-100)
F AD-622 939 FLD.11/7

•AF33 615 1914
AIRCRAFT ARMAMENTS INC COCKEYSVILLE MD
(ARL 69-139)
F AD-622 394 FLD.14/5

•AF33 615 1972
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF
GD/C AWV69 001
F AD-622 810 FLD.17/2.1

•AF33 615 1999
HUGHES RESEARCH LABS MALIBU CALIF
AD-622 338 FLD.20/6

•AF33 615 2532
TRANSDUCER INFORMATION CENTER BATTELLE MEMORIAL INST COLUMBUS OHIO
TIC ACCESSION LIST NO. 10
AD-622 918 FLD.14/2

•AF33 616 6049
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
TB 1288 F 1
(WADC TR-59-754 P1)
AD-622 615 FLD.1/3

•AF33 616 8081
BOEING CO SEATTLE WASH AEROSPACE GROUP
(ASD TDR-63-949 S1)
AD-622 831 FLD.20/4

•AF33 616 8271
TOLEDO UNIV RESEARCH FOUNDATION OHIO
(ARL 69-179)
F AD-622 611 FLD.20/4

•AF33 616 8390
RESEARCH AND ADVANCED DEVELOPMENT DIV AVCO CORP WILMINGTON MASS
(ARL 69-164)
F AD-622 391 FLD.20/3

•AF33 657 10416
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS AERODYNAMIC LAB
TR 6
AD-622 522 FLD.20/4
(FDL TR-65-99)
F AD-622 802 FLD.20/4

•AF33 657 10844
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
(ML TR-69-194)
F AD-622 881 FLD.11/6

•AF33 657 11142
MELLON INST PITTSBURGH PA
AD-622 921 FLD.7/3

•AF33 657 11598
MICHIGAN UNIV ANN ARBOR LIQUID METALS LAB
08750 23 P
AD-622 825 FLD.20/13

•AF33 657 11712
NORAIR DIV NORTHROP CORP HAWTHORNE CALIF
NOR 69 4
F AD-622 395 FLD.20/4

•AF33 657 7874
TORONTO UNIV (ONTARIO) INST FOR AEROSPACE STUDIES
UTIAS R 25
F AD-622 693 FLD.19/1

•AF33 657 8981
OHIO STATE UNIV COLUMBUS AERONAUTICAL AND ASTRONAUTICAL RESEARCH LABS
TR 4
AD-622 692 FLD.7/2

•AF49 638 1037
STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES
TR 73
(AFOSR 69-1595)
AD-622 587 FLD.5/10

•AF49 638 1060
STANFORD UNIV CALIF STANFORD ELECTRONICS LABS
(AFOSR 69-1389)
AD-622 645 FLD.9/2

•AF49 638 1125
RADIATION APPLICATIONS INC LONG ISLAND CITY N Y
(AFOSR 69-1435)
AD-622 649 FLD.21/5.2

•AF49 638 1129
AVCO EVERETT RESEARCH LAB EVERETT MASS
(AFOSR 69-1207)
F AD-622 701 FLD.20/3

•AF49 638 1132
WARNER AND SWASEY CO FLUSHING N Y CONTROL INSTRUMENT DIV
(AFOSR 69-1436)
AD-622 691 FLD.20/13

•AF49 638 1152
GENERAL ELECTRIC CO PHILADELPHIA PA MISSILE AND SPACE DIV
(AFOSR 69-0808)
F AD-622 591 FLD.20/4

•AF49 638 1157
GENERAL ELECTRIC CO PHILADELPHIA PA MISSILE AND SPACE DIV
(AFOSR 69-1231)
AD-622 759 FLD.7/4

•AF49 638 1215
GENERAL ELECTRIC CO PHOENIX ARIZ COMPUTER LAB
(AFOSR 69-1165)
AD-623 068 FLD.12/1

•AF49 638 1222
ATOMICS INTERNATIONAL CANOGA PARK CALIF
AI 65 77
(AFOSR 69-1266)
AD-622 527 FLD.21/8

•AF49 638 1245
WESTINGHOUSE ELECTRIC CORP PITTSBURGH PA
AD-622 796 FLD.20/2

•AF49 638 1253
STANFORD UNIV CALIF INST FOR MATHEMATICAL STUDIES IN THE SOCIAL SCIENCES
TR 73
(AFOSR 69-1595)
AD-622 587 FLD.5/10

•AF49 638 1271
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES
749
AD-622 565 FLD.20/4

•AF49 638 1271 GRANT
PRINCETON UNIV N J GAS DYNAMICS LAB
711
(AFOSR 69-01931)
AD-622 566 FLD.20/4

•AF49 638 1279
REACTION MOTORS DIV THIOKOL CHEMICAL CORP DENVILLE N J
RMD 5516 F
(AFOSR 69-1208)
F AD-622 524 FLD.21/8

•AF49 638 1299
CALIFORNIA INST OF TECH PASADENA SEISMOLOGICAL LAB
AD-622 546 FLD.8/11

•AF49 638 1341
STANFORD UNIV CALIF DEPT OF CHEMISTRY
(AFOSR 69-1450)
AD-622 628 FLD.7/4

•AF49 638 1345
STANFORD UNIV CALIF DEPT OF MATHEMATICS
(AFOSR 69-1397)
AD-622 651 FLD.12/1

•AF49 638 1357
GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF SPACE SCIENCE LAB
(AFOSR 69-1438)
AD-622 673 FLD.20/3
(AFOSR 69-1437)
AD-622 672 FLD.21/8

•AF49 638 1389
STANFORD UNIV CALIF DEPT OF PHYSICS
(AFOSR 69-1347)
AD-622 618 FLD.20/8

•AF49 638 1389 GRANT
STANFORD UNIV CALIF DEPT OF PHYSICS
(AFOSR 69-1348)
AD-622 619 FLD.20/8

•AF49 638 1445
STD RESEARCH CORP PASADENA CALIF
(AFOSR 69-1417)
AD-622 646 FLD.7/4

•AF49 638 1468
NATIONAL MAGNET LAB MASS INST OF TECH CAMBRIDGE
(AFOSR 69-1380)
AD-622 620 FLD.7/4

•AF49 638 1483
AVCO EVERETT RESEARCH LAB EVERETT MASS
RR 234
AD-622 725 FLD.9/2

•AF49 638 169
NEW YORK UNIV N Y DEPT OF CHEMISTRY
(AFOSR 69-1475)
AD-622 690 FLD.21/2
(AFOSR 69-1476)
AD-622 743 FLD.21/2

•AF49 638 217
POLYTECHNIC INST OF BROOKLYN N Y
(AFOSR TN-58-128)
AD-622 664 FLD.20/4

•AF49 638 253
INSTITUTE FOR ADVANCED STUDY PRINCETON N J
(AFOSR 69-1396)
AD-622 750 FLD.12/1

•AF49 638 590
MARYLAND UNIV COLLEGE PARK
(AFOSR 3986)
AD-622 602 FLD.12/1

•AF49 638 66C0001
RAND CORP SANTA MONICA CALIF
RM 4729 PR
AD-622 744 FLD.9/2

•AF49 638 700
RAND CORP SANTA MONICA CALIF
RM 4709 PR
AD-622 365 FLD.20/4

•AF49 638 897
RENSSELAER POLYTECHNIC INST TROY N Y
(AFOSR 69-1492)
AD-622 923 FLD.7/4

•AF49 638 913
MAREMONT CORP PASADENA CALIF RESEARCH DIV
(AFOSR 69-1433)
AD-622 674 FLD.7/4

•AF49 638 930
RIAS INC BALTIMORE MD
(AFOSR 4981)
AD-622 613 FLD.12/1

•AF61 052 298
GOTEBORG UNIV (SWEDEN) INST OF NEUROBIOLOGY
(AFOSR 69-1500)
AD-623 057 FLD.6/1

•AF61 052 638
OESTERREICHISCHE STUDIENGESELLSCHAFT FUER ATOMENERGIE G M B H SEIBERSDORF PHYSICS
(AFOSR 69-1371)
AD-622 670 FLD.18/4

•AF61 052 678
INNSBRUCK UNIV (AUSTRIA) INST FOR THEORETICAL PHYSICS
SR 28
(AFOSR 69-1320)
AD-622 568 FLD.20/3
(AFOSR 69-1491)
AD-622 692 FLD.20/3

•AF61 052 700
BRUSSELS UNIV (BELGIUM) LABORATOIRE DE CHIMIE PHYSIQUE
(ML TR-69-149)
S AD-622 809 FLD.11/6

•AF61 052 744
TECHNISCHE HOCHSCHULE AACHEN (WEST GERMANY) INSTITUT FUER MECHANIK
(ARL 69-198)
AD-622 390 FLD.20/4

•AF61 514 1118
LOUVAIN UNIV (BELGIUM)
TN 3
AD-622 813 FLD.20/12

•AF61 514 1196
MUSEO NACIONAL DE CIENCIAS NATURALES MADRID (SPAIN) DEPARTAMENTO DE CRISTALOGRAFIA
AD-622 888 FLD.20/2

•AF61 514 1298
ATHENS UNIV (GREECE)
(AFOSR 840)
AD-622 820 FLD.20/12

•AF61 514 638C
BRUSSELS UNIV (BELGIUM)
(EOARDC TN-64P1)
AD-622 798 FLD.20/13
(EOARDC TN-64 P2)
AD-622 799 FLD.20/13
(EOARDC TN-64 P3)
AD-622 800 FLD.20/13
(EOARDC TN-64 P5)
AD-622 801 FLD.20/13

•AF61 514 896
LEYDEN STATE UNIV (NETHERLANDS)
AD-622 808 FLD.7/4
AD-622 949 FLD.20/6

•AF61 514 868
BRUSSELS UNIV (BELGIUM) LABORATOIRE DE CHIMIE PHYSIQUE
AD-622 880 FLD.7/4

•AF61 514 892
CENTRAL INST FOR INDUSTRIAL RESEARCH OSLO (NORWAY)

AD-622 742 FLD.20/2

•AT30 1 3003 3
MASSACHUSETTS UNIV AMHERST
POLYMER RESEARCH INST
TR 79
AD-622 976 FLD.20/6

•AT30 1 3010
WOOSTER COLL OHIO
REFERENCE NO. 65 52
AD-622 716 FLD.8/10

•AT48 1 1780 GRANT
OREGON STATE UNIV CORVALLIS
DEPT OF OCEANOGRAPHY
AD-622 616 FLD.8/10

•DA ARO D31 129 61663
PITTSBURGH UNIV PA CRYSTALLO
GRAPHY LAB
(AROD 3125:5)
AD-622 939 FLD.20/2

•DA ARO D31 1246 930
UTAH STATE UNIV LOGAN DEPT
OF CHEMISTRY
(AROD 4150:3)
AD-622 994 FLD.7/3

•DA ARO D31 1246197
WESTERN RESERVE UNIV CLEVELAND
OHIO
(AROD 2828:4)
AD-622 928 FLD.12/1

•DA ARO D31 1246289
WASHINGTON UNIV SEATTLE
DEPT OF CHEMISTRY
(AROD 3493:8)
F AD-622 700 FLD.7/4

•DA ARO D31 1246920
NEW YORK UNIV N Y RADIATION
AND SOLID STATE LAB
(AROD 3987.1)
AD-622 997 FLD.20/12

•DA ARO D31 1246982
ILLINOIS UNIV URBANA DEPT
OF ELECTRICAL ENGINEERING
(AROD 4832:1)
AD-622 967 FLD.20/3

•DA ARO D31 1246668
MICHIGAN UNIV ANN ARBOR
COMMUNICATION SCIENCES PROGRAM
07363
AD-623 001 FLD.9/2
7363
AD-623 002 FLD.5/7

•DA ARO D31 12461663
PITTSBURGH UNIV PA CRYSTALLO
GRAPHY LAB
(AROD 3125:6)
AD-622 936 FLD.20/2

•DA ARO99 092 64639
INSTITUTO DE INVESTIGACION
AERONAUTICA Y ESPACIAL
BUENOS AIRES (ARGENTINA)
AD-622 898 FLD.20/8

•DA ARO99 092646
MCGILL UNIV MONTREAL (QUEBEC)
A AD-622 760 FLD.20/14

•DA19 020AMC00494X
UNITED AIRCRAFT CORP EAST
HARTFORD CONN RESEARCH LABS
UACRL D910261 4
(AMRA CR-64-09/4)
F AD-622 302 FLD.11/6

•DA22 079ENG330
MASSACHUSETTS INST OF TECH
CAMBRIDGE SOIL MECHANICS
DIV
RR R65 11
AD-622 931 FLD.8/7

•DA28 043AMC00070E
EAGLE-PICHER CO JOPLIN MO
COUPLES DEPT
NA 122
F AD-623 024 FLD.10/3

•DA28 043AMC00221E
EAGLE-PICHER CO JOPLIN MO
COUPLES DEPT
F AD-622 822 FLD.10/3

•DA28 043AMC00259E
UNITED AIRCRAFT CORP EAST
HARTFORD CONN RESEARCH LABS
D920259 12
F AD-622 979 FLD.20/14

•DA28 043AMC00342E
NORTH ELECTRIC CO GALION
OHIO
AD-622 610 FLD.17/2

•DA28 043AMC01268E
ZENITH RADIO RESEARCH CORP
MENLO PARK CALIF
(ECOM 01268-1)
AD-622 974 FLD.9/1

•DA28 043AMC01283E
SYLVANIA ELECTRONIC SYSTEMS
WALTHAM MASS APPLIED RESEARCH
LAB
AD-622 884 FLD.20/12

•DA28 043AMC01344E
UNION CARBIDE CORP PARMA
OHIO RESEARCH LAB
AD-623 013 FLD.9/9

•DA31 124ARO D102
GATES AND CRELLIN LABS OF
CHEMISTRY CALIF INST OF
TECH PASADENA
(AROD 3406:8)
AD-622 932 FLD.7/2

•DA31 124ARO D131
CARNEGIE INST OF TECH PITTSBURGH
PA DEPT OF ELECTRICAL ENGINEERING
(AROD 3397:7)
AD-622 961 FLD.20/12

•DA31 124ARO D194
TOWNE SCHOOL OF CIVIL AND
MECHANICAL ENGINEERING UNIV
OF PENNSYLVANIA PHILADELPHIA
AD-622 934 FLD.20/12

•DA31 124ARO D47
MASSACHUSETTS INST OF TECH
CAMBRIDGE CORROSION LAB
(AROD 2841:4)
AD-622 661 FLD.11/6

•DA31 124ARO D82
ILLINOIS UNIV URBANA DEPT
OF CHEMISTRY AND CHEMICAL
ENGINEERING
(AROD 3717:8)
AD-623 071 FLD.7/3

•DA31 124ARO D90
STEVENS INST OF TECH HOBOKEN
N J DEPT OF CHEMISTRY AND
CHEMICAL ENGINEERING
(AROD 3930:4)
AD-622 930 FLD.7/4

•DA31 124ARO D331
OPERATIONS RESEARCH CENTER
UNIV OF CALIF BERKELEY
ORC 65 31
AD-622 901 FLD.12/1

•DA36 039AMC02287
AERONUTRONIC DIV PHILCO CORP
NEWPORT BEACH CALIF
U 3259
AD-622 398 FLD.20/6

•DA36 039AMC00097E
MICROWAVE ASSOCIATES INC BURLINGTON
MASS
AD-622 683 FLD.9/1

•DA36 039AMC01497
NATIONAL CO INC MELROSE MASS
AD-622 937 FLD.9/1

•DA36 039AMC01479E
ERIE TECHNOLOGICAL PRODUCTS
INC PA
AD-622 984 FLD.9/1

•DA36 039AMC03189E
TRW SEMICONDUCTORS INC LAWNDALE
CALIF RESEARCH AND DEVELOPMENT
DEPT
99 RD F
F AD-622 879 FLD.9/1

•DA36 039AMC03200E
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
AD-623 059 FLD.20/3
AD-623 058 FLD.9/9

•DA36 039AMC03200E GRANT
RESEARCH LAB OF ELECTRONICS
MASS INST OF TECH CAMBRIDGE
AD-622 937 FLD.6/16
AD-623 049 FLD.9/9
AD-623 093 FLD.9/1
AD-623 066 FLD.6/16
AD-623 067 FLD.9/1

•DA36 039AMC03201E
ROCKETDYNE CANOGA PARK CALIF
R 9405 8
F AD-622 818 FLD.10/3

•DA36 039AMC03270E
MICTRON INC ALBANY N Y
AD-622 963 FLD.9/1

•DA36 039AMC03632E
TEXAS INSTRUMENTS INC DALLAS
TI 03 65 76
AD-622 982 FLD.9/1

•DA36 039AMC06199E
FAIRCHILD SEMICONDUCTOR DIV
FAIRCHILD CAMERA AND INSTRUMENT
CORP MOUNTAIN VIEW CALIF
AD-622 821 FLD.9/1

•DA36 039AMC06162E
BOMAC DIV VARIAN ASSOCIATES
BEVERLY MASS
AD-622 827 FLD.9/1

•DA36 039SC89967
ITT ELECTRON TUBE DIV ROANOKE
VA
AD-622 877 FLD.9/1

•DA36 039SC89973
KNIGHTS (JAMES) CO SANDWICH
ILL
AD-622 561 FLD.9/3

•DA36 039SC87222
BROWN UNIV PROVIDENCE R I
F AD-623 027 FLD.12/1

•DA36 039SC87242E
STEVENS INST OF TECH HOBOKEN
N J DEPT OF PHYSICS
SIT P147 (5/65)
F AD-622 815 FLD.20

•DA36 039SC90789
GENERAL ELECTRIC CO SYRACUSE
N Y ELECTRONICS LAB
F AD-622 406 FLD.9/1

•DA36 039SC90878
MELPAR INC FALLS CHURCH VA
12
F AD-622 719 FLD.10

•DA99 177ANC11ST
STANFORD UNIV CALIF DEPT
OF AERONAUTICS AND ASTRONAUTICS

(USAAVLABS TR-69-61)
F AD-622 985 FLD.1/3

•DA99 177AMC2367
LOCKHEED-CALIFORNIA CO BURBANK
LR 18408
(USAAVLABS TR-69-29)
AD-622 978 FLD.1/2

•DA99 177AMC2917
BOEING CO MORTON PA VERTOL DIV
R 379
(USAAVLABS TR-69-96)
F AD-622 986 FLD.1/3

•DA99 177AMC87T
SIKORSKY AIRCRAFT DIV UNITED AIRCRAFT CORP STRATFORD CONN
SER 30909
(USAAVLABS TR-69-51)
F AD-622 912 FLD.1/3

•DA99 188AR02
HUMAN RESOURCES RESEARCH OFFICE GEORGE WASHINGTON UNIV ALEXANDRIA VA
AD-623 040 FLD.5/10

•DA99 D07MD938
MICHIGAN UNIV ANN ARBOR
SCHOOL OF DENTISTRY
AD-622 922 FLD.6/5

•DA99 196XZ112
STANFORD RESEARCH INST MENLO PARK CALIF
(DASA 1919-1)
AD-622 371 FLD.5/2

•DA99 1860RD1012
UNITED NUCLEAR CORP WHITE PLAINS N Y DEVELOPMENT DIV
UNC 5006
AD-622 301 FLD.5/2

•DA99 193MD2238
MARYLAND UNIV COLLEGE PARK
DEPT OF ZOOLOGY
(TT 69-69293)
AD-622 878 FLD.6/5

•DA99 193MD2273
GEORGE WASHINGTON UNIV WASHINGTON D C BLOOD RESEARCH LAB
AD-622 959 FLD.6/16

•DA99 193MD2281
IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER
IITRI L 6021 5
A AD-622 983 FLD.6/5

•DA99 193MD2329
GEORGE WASHINGTON UNIV WASHINGTON D C BLOOD RESEARCH LAB
AD-622 959 FLD.6/16

•DA99 193MD2701
NEW YORK STATE UNIV ALBANY
RESEARCH FOUNDATION
A AD-623 029 FLD.6/16

•DRB 8810 02
MANITOBA UNIV WINNIPEG DEPT OF MEDICINE
AD-622 761 FLD.6/16

•DRB2809 05
SASKATCHEWAN UNIV SASKATOON
AD-622 671 FLD.5/2

•DRB7910 14
ROYAL MILITARY COLL OF CANADA
KINGSTON (ONTARIO)
AD-622 749 FLD.11/6

•FA WA5942
TECHNOLOGY INC DAYTON OHIO
(SRDS RD-69-60)
F AD-622 866 FLD.1/2

•FA WA9624
AIRBORNE INSTRUMENTS LAB
DEER PARK N Y
(SRDS RD-69-87)
F AD-622 864 FLD.17/7

•FA WA9710
UNIVAC DIV SPERRY RAND CORP
ST PAUL MINN
PX 3489
(SRDS RD-69-98)
F AD-622 869 FLD.17/7

•FA69WA1192
TRAVELERS RESEARCH CENTER INC HARTFORD CONN
7468 172
(SRDS RD-69-74)
AD-622 861 FLD.1/2

•GRANT NSF GP2232
OREGON STATE UNIV CORVALLIS
DEPT OF OCEANOGRAPHY
AD-622 679 FLD.5/2

•GRANT NSF GP2639
OPERATIONS RESEARCH CENTER
UNIV OF CALIF BERKELEY
ORC 69 20
AD-622 900 FLD.12/1

•GRANT NSF GP971
CORNELL UNIV ITHACA N Y
COGNITIVE SYSTEMS RESEARCH PROGRAM
7
AD-622 682 FLD.6/16

•GRANT NSF G23103
OREGON STATE UNIV CORVALLIS
DEPT OF OCEANOGRAPHY
AD-622 689 FLD.8/10

•HE01995
EDSEL B FORD INST FOR MEDICAL RESEARCH DETROIT MICH
AD-622 929 FLD.6/1

•MT1170
MANITOBA UNIV WINNIPEG DEPT OF MEDICINE
AD-622 761 FLD.6/16

•NASW837
AVCO EVERETT RESEARCH LAB
EVERETT MASS
RR 234
AD-622 729 FLD.5/2

•NBY49818
STANFORD UNIV CALIF DEPT OF CIVIL ENGINEERING
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| 623 079 | 6/16 |
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| 623 081 | 22 |
| 623 082 | 20/19 |
| 623 083 | 9/10 |
| 623 084 | 9/9 |
| 623 085 | 19/1 |
| 623 086 | 20/1 |

# OTHER RESEARCH REPORTS AND RELATED MATERIAL

CIVILIAN AGENCY REPORTS, INCLUDING AEC AND NASA, AND MILITARY REPORTS PREVIOUSLY CLASSIFIED OR LIMITED

*Descriptors marked with an asterisk are included in the subject index

## 01. Aeronautics

AD-430 527 Field 1D
CFSTI Price: HC$4.00

Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
A SELECTED BIBLIOGRAPHY AND SUMMARY OF ARTICLES ON AUTOMATIC CONTROL, MARCH 1962 THROUGH DECEMBER 1962. VOLUME I.
Research rept.,
by Peter Dorato. 31 Dec 62, 142p
Rept. no. PIBMRI-1106-62
Contract AF33 657 7951, Proj. 8219, Task 821904
Unclassified report

See also AD-445 989.

Descriptors: (*Flight control systems, Bibliographies), (*Adaptive control systems, Bibliographies), Stability, Optimization, Nonlinear systems, Linear systems, Stochastic processes, Decision making, Automatic.

The report contains an analysis and evaluation of articles related to flight control systems which have appeared journals. Part I contains a general analysis and evaluation of the literature cited. Part II contains a detailed analysis of each article, with authors abstract and conclusions. (Author)

AD-445 889 Field 1D
CFSTI Price: HC$6.00

Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
A SELECTED BIBLIOGRAPHY AND SUMMARY OF ARTICLES ON AUTOMATIC CONTROL, JANUARY 1963 THROUGH NOVEMBER 1963. VOLUME II.
Research rept.,
by Peter Dorato. 30 Nov 63, 243p
Rept. no. PIBMRI-1196-63
Contract AF33 657 7951, Proj. 8219, Task 821904
Unclassified report

See also AD-430 527.

Descriptors: (*Flight control systems, Bibliographies), (*Adaptive control systems, Bibliographies), Stability, Optimization, Nonlinear systems, Linear systems, Stochastic processes, Decision making, Automatic.

N65-21720 Field 1A, 22A
CFSTI Prices: HC$3.00 MF$0.75

Midwest Research Inst., Kansas City, Mo.
STUDY FOR THE INDICIAL LOAD EFFECTS ON MULTISTAGE SPACE VEHICLE SYSTEMS. VOLUME I: LINEARIZED INDICIAL AERODYNAMIC FORCES ON BODIES OF REVOLUTION IN SUPERSONIC FLOW.
Annual summary rept. 21 Jun 63-20 Aug 64,
by William D. Glauz. 21 Aug 64, 93p
Contract NAS8 11012, Proj. 2715P
NASA CR-62199
Unclassified report

Descriptors: (*Aerodynamic loading, Guided missiles), (*Guided missiles, Aerodynamic loading), Cylindrical bodies, Conical bodies, Supersonic flow.

Patent 3,202,372 Field 1E, 13J

CABLE STORAGE AND RETRIEVER UNIT.
Patent assigned to Air Force,
by Harry R. Meline and Niel R. Petersen. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Arresting gear, Hoists), (*Cables-(Mechanical), Storage), Patents, Winding, Shipborne, Runways.

The stationary cable storage drum is capable of receiving from a few hundred to at least two thousand feet of aircraft arresting cable in a single layer. Structure is provided for rewinding the cable quickly around the drum, after it is withdrawn in decelerating the speed of an aircraft. The unit may be used to apply pretension to a deck pendant cable adapted to be stretched across a runway or deck.

Patent 3,204,890 Field 1C, 17F

HELICOPTER AND TOWED VEHICLE THEREFOR.
Patent assigned to Navy,
by John R. Lehn, Harold M. Troxell and Robert C. Helm. 7 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Helicopters, Towed vehicles), Amphibious vehicles, Detection, Underwater, Magnetometers, Detectors, Patents.

The helicopter is designed with structure for carrying atowed vehicle which may be a device for use in a MAD system for the detection of underwater objects. An improved sponson provides easy reception and positive securement of the towed device. The system is designed for use with headwinds and downwinds.

PB-168 464 Field 1C
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Aeronautics (Navy), Washington, D. C. Research Div.
DUCTED PROPELLER DEVELOPMENT STATUS,
by Arthur Stone. Nov 57, 25p Rept. no. DR-1910
AD 158 021
Unclassified report

Descriptors: (*Shrouded propellers, Reviews), Helicopters, Aircraft, Wind tunnel models, Vertical take-off planes, Ring wings, Flying platforms, Ground effect machines.



794-373 0 - 65 - 16

An examination of the ducted propeller field was conducted in order to present a simple and concise summary of its applications and developmental status. The study shows that for a given horsepower and propeller diameter, the ducted propeller has a 60 per cent static thrust advantage. Empirically, the ratio of plain to ducted propeller diameter to yield the same static thrust at a given horsepower is 2.0. It is concluded that the low horsepower, light airplane, should utilize the plain propeller whereas the ducted propeller is best suited for the higher horsepower, heavier airplane. The study indicates that the lack of experimental information on the ducted propeller is detrimental to its application development. Several illustrations are included to demonstrate possible applications. (Author)

PB-168 479 Field 1C
CFSTI Prices: HC$4.00 MF$0.75

Advanced Research Div., Hiller Helicopters, Palo Alto, Calif.
FLYING CRANE TRANSPORTATION SYSTEMS 1962-1967. DUCTED PROPELLER TECHNICAL STUDY.
by R. Greenman, R. Newman, and G. J. Sissingh.
1964, 109p ARD-124
Contract DA44 177TC382
AD 127 939

Unclassified report

Descriptors: (*Helicopters, Shrouded propellers), (*Shrouded propellers, Aerodynamic characteristics), Performance(Engineering), Optimization, Hovering, Flight speeds, Pitch(Motion), Flight control systems, Helicopter hoists.

The potentials are evaluated of a ducted fan type flying crane. An optimization study is conducted for a series of given missions characterized by payload, range, and hover time.

## 02. Agriculture

No entries

## 03. Astronomy and Astrophysics

No entries

## 04. Atmospheric Sciences

N65-21392 Field 4B, 22B
CFSTI Prices: HC$2.00 MF$0.50

National Aeronautics and Space Administration, New York. Goddard Inst. for Space Studies.
EVALUATION OF TIROS INFRARED DATA,
by C. Prabhakara and S. L. Rasool. Sep 62, 29p
X-644-62-77
NASA TM-X-55178

Unclassified report

Presented at the Intern. Symp. on Rocket and Satellite Meteorology, Washington, D. C., 23-25 Aug 62.

Descriptors: (*Meteorological satellites, Infrared radiation), (*Infrared radiation, Climatology), Meteorological parameters.

PB-168 371 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

Chicago Univ., Ill. Dept. of Meteorology.
MODIFICATION OF HURRICANES THROUGH CLOUD SEEDING,
by R. R. Braham, Jr. and E. A. Neil. May 58, 15p
NHRP 16

Unclassified report

Descriptors: (*Tropical cyclones, Artificial precipitation), (*Artificial precipitation, Tropical cyclones), Storms, Injection, Solidified gases, Carbon dioxide, Energy management.

PB-168 372 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

Chicago Univ., Ill. Dept. of Meteorology.
ANALYSIS OF TROPICAL STORM FRIEDA, 1957; A PRELIMINARY REPORT,
by Herbert Riehl and R. C. Gentry. Jun 58, 19p
NHRP 17

Unclassified report

Research performed in cooperation with National Hurricane Research Project, West Palm Beach, Fla.

Descriptors: (*Tropical cyclones, Air mass analysis), (*Air mass analysis, Tropical cyclones), (*Marine meteorology, Tropical cyclones), (*Hurricane tracking, Air mass analysis), Storms, Dynamics, Meteorological parameters, Measurement, Aircraft.

This discussion of the development of tropical storm Frieda describes the situation first near the surface (approximately 1200 to 1500 feet), then in the middle troposphere and, finally, in the upper troposphere. Charts are presented showing detailed analyses of the wind, temperature, and pressure fields for September 21, 22, and 23, 1957.

PB-168 374 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

Massachusetts Inst. of Tech., Cambridge.
FURTHER EXAMINATION OF THE BALANCE OF ANGULAR MOMENTUM IN THE MATURE HURRICANE,
by Richard L. Pfeffer. Jul 58, 19p
Contract Cwb9009
NHRP 19

Unclassified report

Descriptors: (*Tropical cyclones, Air mass analysis), (*Air mass analysis, Tropical cyclones), (*Marine meteorology, Tropical cyclones), (*Hurricane tracking, Air mass analysis), Storms, Coriolis effect, Wind, Rotation, Momentum.

The Angular momentum equation for an arbitrary rotating system in the atmosphere is examined. It is shown that the Coriolis torque serves to redistribute relative angular momentum without altering to any marked degree the total amount within the system. In particular, where the action of the Coriolis torque tends to develop a cyclone near the ground it must tend to develop an equally intense anticyclone aloft. In order that a rotational system, such as the hurricane, develop through a considerable depth of the atmosphere, the tendency for an upper level anticyclone to be created by the Coriolis torque must be compensated by a transport of angular momentum into the system.

An observational study is presented which shows that, in the case of the mature hurricane, both azimuthal-mean motions and horizontal-eddy processes play important roles in accomplishing this transport. (Author)

PB-168 377 Field 4B, 4A
CFSTI Prices: HC$2.00 MF$0.50

Chicago Univ., Ill.
ON PRODUCTION OF KINETIC ENERGY FROM CONDENSATION HEATING,
by Herbert Riehl. Oct 58, 28p
NHRP 22

Unclassified report

Descriptors: (*Atmospheric motion, Thermodynamics), (*Anticyclones, Thermodynamics), (*Thermodynamics, Anticyclones), Dynamics, Energy, Condensation, Heating, Marine meteorology, Tropical regions.

Warm anticyclones extending to the high troposphere are usually regarded as 'dynamic' anticyclones. In this paper a situation is presented where a warm High was of thermal origin, produced and maintained by release of latent heat of condensation. The interior of the High was filled with cloud and rain; maximum precipitable water content of the air was found in the central parts on the High.

PB-168 379 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Washington, D. C.
DISTRIBUTION OF SURFACE FRICTION IN HURRICANES,
by Lester F. Hubert. Nov 58, 24p
Rept. no. NHRP-25

Unclassified report

Descriptors: (*Tropical cyclones, Dynamics), (*Air mass analysis, Tropical cyclones), (*Marine meteorology, Tropical cyclones), Storms, Boundary layer, Friction, Fluid mechanics.

Terms of the horizontal equations of motion are evaluated from surface analysis of three hurricane and three non-hurricane cases in order to investigate the components of friction (tangential to and normal to the anemometer wind direction) in the boundary layer. A method of moisture flux analysis is developed to study the variation of height of the inflow layer which in turn yields a clue concerning the variation of stress profile in time and space. While the magnitude of friction increases toward the hurricane center it is clear that it is not a simple function of wind speed or surface roughness. It is also shown that, (1) the component of friction normal to the surface wind direction is almost always significant, (2) accelerations are quite small and are not correlated with the downstream pressure force, (3) accelerations and angle of cross-isobar flow are correlated, and (4) total friction is not correlated with angle of cross-isobar flow. (Author)

PB-168 383 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

Chicago Univ., Ill.
EXCHANGE OF HEAT, MOISTURE, AND MOMENTUM BETWEEN HURRICANE ELLA (1958) AND ITS ENVIRONMENT,
by M. Gangpadhyaya and Herbert Riehl. Apr 59, 16p
NHRP 29

Unclassified report

Research performed in cooperation with Meteorological Service of India.

Descriptors: (*Tropical cyclones, Thermodynamics), (*Marine meteorology, Tropical cyclones), Storms, Atlantic Ocean, Caribbean Sea, Heat transfer, Moisture, Momentum, Dynamics, Hurricane tracking.

On September 2, 1958, a tropical storm moved near the center of the network of upper-air observations in the Atlantic and Caribbean southeast of Florida. This made possible determination of the structure of the storm at a radius of 4.5 degree latitude from the center through the entire troposphere and computation of surface integrals concerning the exchange of heat, moisture, and momentum between the storm and its surroundings. It was found that a net heat export occurred indicating a net tropospheric drying and cooling after inclusion of radiation. The inward transport of relative angular momentum was insufficient to balance the flux of angular momentum to the ground as estimated from calculations for the mean hurricane. These computations then suggest weakening of the disturbance with time, and this actually occurred. (Author)

PB-168 386 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

Chicago Univ., Ill.
WIND AND PRESSURE FIELDS IN THE STRATOSPHERE OVER THE WEST INDIES REGION IN AUGUST 1958,
by Hans Ulrich Groening. Dec 59, 13p
NHRP 35

Unclassified report

Descriptors: (*Stratosphere, West Indies), (*Marine meteorology, West Indies), Barometric pressure, Wind, Air mass analysis, Tropical cyclones, Hurricane tracking.

The high-level wind and pressure fields over the West Indies area in August 1958 are investigated. In the stratosphere, at 50 mb. and 25 mb. the steady easterly flow is found to be quasi-geostrophic. Since contour analyses do not give a true picture of the wind field at these high levels, due to the inaccuracies of the pressure - height data, a method to eliminate these shortcomings is outlined. (Author)

PB-168 389 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

Massachusetts Inst. of Tech., Cambridge, Dept. of Meteorology.
ON INITIATION OF TROPICAL DEPRESSIONS AND CONVECTION IN A CONDITIONALLY UNSTABLE ATMOSPHERE.
Final rept.,
by H. L. Kuo. Oct 60, 49p
Contracts Cwb9488, Cwb9726
NHRP 40

Unclassified report

Descriptors: (*Marine meteorology, Tropical cyclones), (*Tropical cyclones, Thermodynamics), Storms, Sources, Meteorological parameters, Perturbation theory, Atmosphere, Stability, Convection, Hurricane tracking, Mathematical models.

A study is made of the nature of the small perturbations in an absolutely unstable or a conditionally unstable atmosphere, and then the most preferred scale of motion is determined by finding the one which yields the highest growth rate. The effects of the hydrostatic and the balance approximations on the solutions are also analyzed. It is shown that in such an atmosphere which is at rest and is either absolutely or conditionally unstable, only cumulus cloud type convection can be expected to evolve if random infinitesimal perturbations are introduced. An organizing mechanism is definitely needed in order to build up a large-scale circulation if unstable stratification is the source of

energy. The possible mechanism which will produce such an organizing effect is also explored. It is shown that such an organizing effect can be produced in an unsaturated conditionally unstable atmosphere by random but finite perturbations if the vertical velocity associated with the longer waves exceeds a threshold velocity of about 2 cm./sec. Finally, the effect of stable layers above and below the unstable layer on convection is investigated. The maximum vertical and horizontal velocities attainable from the unstable stratifications observed in the Tropics are determined, and the vertical transport of heat and the mean temperature distribution from the solution are obtained.

PB-168 398 Field 4B
CFSTI Prices: HC$3.00 MF$0.50

Weather Bureau, Washington, D. C. Hydrometeorological Section.
SOME PROPERTIES OF HURRICANE WIND FIELDS AS DEDUCED FROM TRAJECTORIES,
by Vance A. Myers and William Malkin. Nov 61, 51p Rept. no. NHRP-R-49
Unclassified report

Descriptors: (*Tropical cyclones, Air mass analysis), (*Wind, Tropical cyclones), (*Marine meteorology, Tropical cyclones), Storms, Boundary layer, Atmospheric motion, Mathematical prediction, Weather forecasting, Hurricane tracking.

Surface wind fields for hurricanes are simulated by a trajectory technique. Both normal and tangential components of friction are considered. The technique applies to a moving as well as a stationary storm and only the pressure profile and frictional coefficients need be specified. The trajectory technique is applied to test several theoretical suppositions, some of which are developed from equations of motion. Among the aspects considered are (a) causes and character of the asymmetry of surface wind fields, and (b) wind field modifications due to motion of the hurricane, variation in pressure gradient, and variation in frictional coefficients. An 'equilibrium wind' concept for flow with friction is suggested as a logical counterpart to the gradient wind for flow with friction neglected. (Author)

PB-168 404 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Miami, Fla.
VERTICAL WIND PROFILES IN HURRICANES,
by H. F. Hawkins. Jun 62, 20p
Rept. no. NHRP-R-55
Unclassified report

Descriptors: (*Tropical cyclones, Air mass analysis), (*Marine meteorology, Tropical cyclones), (*Wind, Tropical cyclones), (*Hurricane tracking, Air mass analysis), Weather forecasting, Meteorological parameters.

PB-168 405 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Miami, Fla.
A THEORETICAL ANALYSIS OF THE FIELD MOTION IN THE HURRICANE BOUNDARY LAYER,
by Stanley L. Rosenthal. Jun 62, 16p
Rept. no. NHRP-R-56
Unclassified report

Descriptors: (*Tropical cyclones, Air mass analysis), (*Marine meteorology, Tropical cyclones), (*Hurricane tracking, Air mass analysis), Wind, Boundary layer, Thermodynamics, Fluid mechanics, Theory.

Radial motions (and, hence, divergence and vertical motions) in a steady state, symmetrical vortex can exist only in the presence of tangential friction. The field of vertical motion in a mature hurricane must, therefore, be closely related to the frictional force field. In the present paper, the hurricane inflow layer is treated as a generalized Ekman problem. The theoretical development is similar to a derivation presented in 1935 by B. Haurwitz (Beitrage zur Geophysik, v.45:243-267 (1935) and v.47:206-214 (1936)) in which the classical Ekman theory was modified to include centrifugal effects and momentum advection. Here, however, a more realistic pressure field is utilized. When centrifugal and shearing effects are included, the Ekman layer equations are nonlinear. To obtain solutions, the field of motion is considered as the sum of the gradient wind and a steady, frictionally produced perturbation. The usual perturbation techniques are used to linearize the equations and the field of motion is obtained for a model pressure field which resembles that of the lower layers of hurricanes. The solutions are discussed in detail. (Author)

PB-168 406 Field 4B
CFSTI Prices: HC$3.00 MF$0.75

Weather Bureau, Washington, D. C.
ON THE DYNAMICS OF DISTURBED CIRCULATION IN THE LOWER MESOSPHERE.
Doctoral thesis,
by R. H. Simpson. Aug 62, 75p Rept. no. NHRP-R-57
Unclassified report

Descriptors: (*Air mass analysis, Upper atmosphere), (*Upper atmosphere, Atmospheric motion), (*Atmospheric motion, Upper atmosphere), West Indies, Atmospheric sounding, Meteorological balloons.

Rawinsonde data from the West Indies, obtained during a winter period when most sounding balloons rose above 100,000 ft, were used to investigate the structure and dynamics of a large-scale disturbance in the lower mesosphere. The disturbance consisted of a shearing surface which sloped poleward and moved toward higher latitude at 12 kt. Its circulations increased with height and were most intense above 30 km. In many respects it resembled the equatorial shear line of the troposphere. For the period of investigation, January 15 to February 3, 1960, temperatures in the lower mesosphere decreased equatorward from maximum values located near the Tropic of Cancer. East winds, increasing with height, extended poleward as far as the 35th parallel, with strong west winds farther north. The appearance of the shear line system in this setting led to a shortlived reversal of the mean meridional temperature gradient. Particle trajectories computed relative to the moving system show that air which entered the system on the poleward side was overtaken by the shear line after about two days. However, air entering from the equatorward side never overtook the shear line, and in this sector the exchange of air with the environment occurred at less than half the rate indicated for the poleward sector. (Author)

PB-168 407 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

Meteorological Agency, Tokyo (Japan).
MEAN SOUNDING DATA OVER THE WESTERN TROPICAL PACIFIC OCEAN DURING THE TYPHOON SEASON. DISTRIBUTION OF TURBULENCE AND ICING IN THE TROPICAL CYCLONE,
by Kenji Shimada and Z. Hashiba. Oct 62, 46p

Rept. no. NHRP-R-58
Contract Cwb10229

Unclassified report

Descriptors: (*Tropical cyclones, Pacific Ocean), (*Marine meteorology, Tropical cyclones), Atmospheric sounding, Meteorological parameters, Mexico Gulf, West Indies, Correlation techniques, Turbulence, Ice.

Monthly mean values of height, temperature, and dew point at standard pressure surfaces for the typhoon season, July to October, of the years 1957, 1958, and 1959, were tabulated for fourteen stations in the western tropical Pacific Ocean. Stations were combined into four groups to obtain representative data for four areas in the western tropical Pacific. Mean soundings for these areas are compared with each other and with mean soundings for the Gulf of Mexico and the West Indies. Monthly instability indices were computed for each area. The seasonal trend of the instability index for the Mid-Pacific area shows a good correlation with the trend of the frequency of tropical storms during the typhoon season. (Author)

PB-168 408 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

Weather Bureau, Washington, D. C. Hydrometeorological Section.
RECONSTRUCTION OF THE SURFACE PRESSURE AND WIND FIELDS OF HURRICANE HELENE,
by Charles E. Schauss. Nov 62, 49p
Rept. no. NHRP-R-59

Unclassified report

Descriptors: (*Tropical cyclones, Meteorological parameters), (*Marine meteorology, Tropical cyclones), (*Air mass analysis, Tropical cyclones), (*Hurricane tracking, Air mass analysis), Wind, Barometric pressure, Seacoast, United States.

The purpose of this study is to reconstruct the pressure and wind fields associated with this severe tropical cyclone during the time it threatened the coastal area of southeastern United States. A knowledge of the wind field is required for surge investigations by the Corps of Engineers, Department of the Army, to evaluate wind stresses. The pressure field shows the magnitude of the inverted barometer effect on the surge and also is an aid in obtaining the wind field. (Author)

PB-168 409 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

Weather Bureau, Washington, D. C.
A CLOUD SEEDING EXPERIMENT IN HURRICANE ESTHER, 1961.
Revised ed.,
by R. H. Simpson, M. R. Ahrens, and R. D. Decker.
Apr 63, 35p Rept. no. NHRP-R-60
Grant NSF G17993

Unclassified report

Revision of manuscript submitted Nov 62.

Descriptors: (*Tropical cyclones, Artificial precipitation), (*Artificial precipitation, Tropical cyclones), (*Marine meteorology, Tropical cyclones), Inhibition, Storms, Injection, Silver compounds, Iodides, Heat of fusion, Heat of sublimation, Radar scanning, Energy management, Hurricane tracking.

In September 1961 cloud seeding experiments were conducted in hurricane Esther on two consecutive days. The purpose was to determine whether artificial releases of latent heat of fusion and sublimation could be used to induce circulation instabilities leading to a reduction of maximum wind speeds. Pyrotechnic generators, dropped from aircraft in the tops of clouds, released vertical plumes of silver iodide which were subsequently spread downstream by the hurricane circulation. Results were monitored by research aircraft which maintained continuous radar coverage of a test area and measured changes in kinetic energy before and after seeding. A marked reduction in reflectivity of 10-cm. radar energy was observed in the test area after the silver iodide was released. Also the kinetic energy diminished. However, the small magnitude of the change and limitations of the analysis restricted the conclusions which can be drawn on the basis of these initial experiments. (Author)

PB-168 411 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

Chicago Univ., Ill. Dept. of Physical Sciences.
THE DISTRIBUTION OF LIQUID WATER IN HURRICANES.
Hurricane research rept. no. 5, 1 Jul 59-30 Jun 60,
by B. Ackerman. Apr 63, 45p
Contract Cwb9720
NHRP R-62

Unclassified report

Continuation of Contract Cwb9484.

Descriptors: (*Tropical cyclones, Water), (*Marine meteorology, Tropical cylones), Hurricane tracking, Aircraft, Flight paths, Moisture, Measurement, Radar scanning.

PB-168 412 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

Colorado State Univ., Fort Collins.
SOME RELATIONS BETWEEN WIND AND THERMAL STRUCTURE OF STEADY STATE HURRICANES,
by Herbert Riehl. Jun 63, 31p Rept. no. NHRP-R-63

Unclassified report

Descriptors: (*Tropical cyclones, Thermodynamics), (*Marine meteorology, Tropical cyclones), (*Air mass analysis, Tropical cyclones), Storms, Mathematical models, Wind, Surface temperature, Oceans, Heat transfer, Correlation techniques, Marine geophysics, Hurricane tracking.

Several simple integrations are performed to determine to what extent a steady, symmetrical hurricane model can be used to appromate observed storm structure. A two-layer model with inflow and outflow is considered. In the outflow, the absolute angular momentum about the vertical axis at the hurricane center is conserved. In the inflow, conservation of potential vorticity is assumed. The local heat source at the ocean surface is assumed to supply the energy for the generation of hurricane winds. Given this heat source and the vertical wind shear between inflow and outflow layers from the dynamic model, a relation must exist between heat source and momentum sink at the air-water interface, if a particular wind field is to exist in steady state. This relation is computed. Various empirical tests are performed to assess the degree of reality of the model. Observations from hurricanes between 1945 and 1958 are used. It may be concluded that computations with steady, symmetrical models are relevant at least to partial understanding of hurricanes.

PB-168 413 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Miami, Fla.
INSTABILITY ASPECTS OF HURRICANE GENESIS,
by M. A. Alaka. Jun 63, 27p Rept. no. NHRP-R-64

Unclassified report

Descriptors: (*Tropical cyclones, Air mass analysis), (*Air mass analysis, Tropical cyclones), (*Marine meteorology, Tropical cyclones), Atmospheric motion, Stability, Storms, Sources, Hurricane tracking.

The role played by various types of atmospheric instability in developing hurricanes is examined, and arguments are presented in support of the hypothesis that dynamic instability provides a trigger mechanism essential for development. This instability is shown to be released in the form of negative absolute anticyclonic winds when the upper-air anticyclone, under which hurricanes are known to form, reaches a critical intensity during the process of transformation of the initially cold-core disturbance into a warm-core system. From theoretical considerations, upper-air patterns favorable for hurricane formation and the optimum surface position of the disturbance with respect to these patterns are deduced and found to agree with observations and with previously published results. A criterion for detecting areas of instability, based on a streamline analysis of the wind field in conjunction with the reported winds at particular stations, is developed and applied to the conditions prevailing during the formative stage of hurricane Carla (1961). It is found that intensification into a hurricane rapidly follows the occurrence of absolute anticyclonic winds over a sizable are in the upper troposphere, above and downstream from the surface position of the nascent storm. (Author)

PB-168 414 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Miami, Fla.
ON THE EVOLUTION OF THE WIND FIELD DURING THE LIFE CYCLE OF TROPICAL CYCLONES,
by Jose A. Colon. Nov 63, 40p
Rept. no. NHRP-R-65

Unclassified report

Descriptors: (*Tropical cyclones, Air mass analysis), (*Air mass analysis, Tropical cyclones), (*Marine meteorology, Tropical cyclones), (*Hurricane tracking, Air mass analysis), Wind, Configuration, Dynamics.

The structure of the wind field of tropical cyclones and its changes with time during the intensification and dissipation stages are studied by means of radial wind profiles recorded by the Weather Bureau research aircraft. It is found that hurricanes seem to conform to two types of evolution. In one type, exemplified by hurricane Daisy of 1958, a characteristic wind-maximum located at a small radius - or small eye - developed quite early in the genesis stage; growth than proceeded with little or no decrease in eye-diameter and resulted in a wind configuration with a very concentrated zone of maximum winds and large values of anticyclonic shear. In another type of evolution, exemplified by hurricanes Helene of 1958 and Carla of 1961, there was initially a rather disorganized wind field with large radius of maximum wind - or large eye; as intensification proceeded the eye diameter was reduced significantly and the wind profiles were characterized by less anticyclonic shear, less concentration at the radius of maximum wind and, in general, a more extensive circulation. The indications are that the Daisy type of evolution leads to a smaller wind circulation (areally) than the Helene type. Data from a sample of about 15 different storms show that eye diameter tends to decrease as the central pressure decreases, but in the Daisy type the reduction is insignificant. In the dissipation stage, filling of the central pressure is invariably accompanied by an increase in eye diameter, decrease in the maximum winds, but increase in storm size. (Author)

PB-168 415 Field 4B
CFSTI Prices: HC$3.00 MF$0.75

National Hurricane Research Project, Weather Bureau, Miami, Fla.
ON THE FILLING OF TROPICAL CYCLONES OVER LAND, WITH PARTICULAR REFERENCE TO HURRICANE DONNA OF 1960,
by Banner I. Miller. Dec 63, 86p
Rept. no. NHRP-R-66

Unclassified report

Descriptors: (*Tropical cyclones, Diffusion), (*Air mass analysis, Tropical cyclones), (*Hurricane tracking, Air mass analysis), Storms, Thermodynamics, Terrain, Heat transfer, Kinetic theory, Marine meteorology.

The processes which resulted in the dissipation of a tropical cyclone over land have been investigated. The eddy fluxes of latent and sensible heat and the dissipation of kinetic energy at the earth's surface have been computed for a 3-day period. On the first two days the cyclone was over water, and on the third day the center was over land. Hence it was possible to compare the rates of energy exchange at the surface after the character of the lower boundary had changed. Some significant differences in these rates of exchange were detected. Over the oceans, air within the boundary layer flowed toward lower pressure, but the addition of sensible heat by the oceanic heat source was large enough to prevent any adiabatic cooling. Over land, however, the eddy fluxes of latent and sensible heat were very nearly zero. The air within the boundary layer still flowed toward reduced pressure, but, in the absence of a heat source, moist adiabatic cooling took place. This resulted in the destruction of the radial gradient of equivalent potential temperature within the boundary layer. Following ascent to the middle or upper troposphere, the warm-core structure of the cyclone was destroyed. This cooling resulted in a pressure rise at the center of the cyclone and the circulation decayed.

PB-168 416 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Miami, Fla.
ON THE THERMAL STRUCTURE OF DEVELOPING TROPICAL CYCLONES,
by Edward J. Zipser, Jr. Jan 64, 27p
Rept. no. NHRP-R-67

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Tropical cyclones, Thermal properties), (*Marine meteorology, Tropical cyclones), (*Hurricane tracking, Thermal properties), Air mass analysis, Storms, Thermodynamics, Atlantic Ocean, Meteorological charts.

In an effort to determine the nature of the thermal field in the vicinity of developing tropical cyclones as distinguisable by use of data from the existing operational network, thickness charts were constructed for the West Indies area. The development of thirteen Atlantic storms was investigated, these being chosen from the population of 1958-1962 Atlantic storms by including only those favorably situated relative to the data network. To serve as a control group, nine disturbances which failed to develop were treated in the same manner. The method of analysis of the thickness charts is discussed. The thickness and shear patterns in the vicinity of the storms are described, and comparison made between developing and non-developing cases. Changes in the thickness pattern as development proceeds are discussed briefly. Several different thickness layers are compared and rated for their usefulness in delineating the above patterns. Finally, the operational utility of thickness charts as an aid in predicting cyclogenesis is evaluated. (Author)

PB-168 417 Field 4B
CFSTI Prices: HC$3.00 MF$0.75

National Hurricane Research Project, Weather Bureau, Miami, Fla.
A STUDY OF HURRICANE RAINBANDS,
by R. Cecil Gentry. Mar 64, 90p
Rept. no. NHRP-R-69

Unclassified report

Descriptors: (*Tropical cyclones, Radar scanning), (*Marine meteorology, Tropical cyclones), (*Meteorological radar, Hurricane tracking), (*Hurricane tracking, Meteorological radar), Rainfall, Radar echo areas, Air mass analysis.

The structure and variability of the spiral rainbands of hurricanes are described using data from more than 75 rainbands selected from tropical cyclones that occurred between 1957 and 1962. Temperature gradients within the bands are as much as 2.5C. per 2 n. mi. and are frequently greater than 1.5C. per 10 n. mi. The anomaly of the mean temperature in the bands varies directly with the intensity of the storm, directly with altitude at least to above the 16,000-ft. level, and inversely with radius in the area within about 50 n. mi. of the eye wall. Winds along the bands vary greatly and apparently in association with microscale features of the band. Gradients in wind speed frequently exceed 10 kt. per 5 n. mi. and sometimes exceed 20 kt. per 5 n. mi. These gradients in wind speed are not as great as those along radii near the center of the storm, but are far greater than previously indicated for variations along the bands. Relatively extensive exchange of air takes place both in the outer bands and in the eye walls, and between the various bands and their immediate environments. This is indicated by the large gradients of the component of the wind normal to the bands both within the bands and in the air 1 to 5 mi. on either side of the bands. There is evidence that a small portion of the air that ascends from near the surface to the upper troposphere may accomplish the ascent with very little mixing with ambient air, but most of the air that reaches as high as 35,000 ft. has been thoroughly mixed with other air at the various elevations between that level and the surface. This mixing affects the temperature distribution within the hurricane as well as the energetics of the storm. (Author)

PB-168 418 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

National Hurricane Research Project, Weather Bureau, Miami, Fla.
SOME THEORETICAL RESULTS WHICH PERTAIN TO THE UPPER-TROPOSPHERIC VORTEX TRAINS OF THE TROPICS,
by Stanley L. Rosenthal. Apr 64, 32p
Rept. no. NHRP-R-70

Unclassified report

Descriptors: (*Marine meteorology, Tropical regions), (*Troposphere, Marine meteorology), (*Vortices, Marine meteorology), (*Air mass analysis, Marine meteorology), Meteorological parameters, Perturbation theory, Mathematical models, Tropical cyclones.

It is generally assumed that the vortex trains of the upper tropical troposphere are indirect circulations which require an external source of kinetic energy for their maintenance. In this investigation, the linearized, quasi-geostrophic equations were solved numerically as an initial value problem. Several base states, which resemble actual conditions when upper-tropospheric vortex trains exist, were treated. The amplitude of the initial perturbation varied with altitude in a fairly realistic fashion. The phase of the perturbation was initially invariant with altitude. Integrations were carried out to 48 hr. The results indicate that disturbances with wavelengths of, and in excess of, 300 km. are not damped. This is felt to be evidence opposed to the contention that the tropical vortex trains are indirect circulations. (Author)

PB-168 419 Field 4B
CFSTI Prices: HC$1.00 MF$0.50

Florida State Univ., Tallahassee. Dept. of Meteorology.
ENERGY GENERATION AND FLUX PROCESSES ASSOCIATED WITH A WEAKENING DEPRESSION OVER THE GULF OF MEXICO,
by M. A. Lateef. Jun 64, 15p
NHRP R-71

Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Marine meteorology, Mexico Gulf), (*Air mass analysis, Marine meteorology), (*Tropical cyclones, Dynamics), Storms, Energy, Atmospheric sounding, Aircraft, Flight paths, Hurricane tracking.

The dissipation on September 21, 1963, of a depression over the Gulf of Mexico, has been investigated in terms of kinetic energy transport and generation processes. To evaluate these processes, data provided by research flights at the 800- and 600-mb. levels were used. Results show that the limited atmospheric region under study not only was subject to internal conversion of kinetic to potential and internal energy but also transported kinetic energy to the surrounding atmosphere. (Author)

PB-168 445 Field 4B
CFSTI Prices: HC$2.00 MF$0.50

National Severe Storms Lab., Norman, Okla.
A COMPARISON OF KINEMATICALLY COMPUTED PRECIPITATION WITH OBSERVED CONVECTIVE RAINFALL.
Technical note,
by James C. Fankhauser. Sep 65, 32p
Rept. no. NSSL-25
WB,DC TN-4

Unclassified report

Descriptors: (*Rainfall, Mathematical prediction), Storms, Air mass analysis, Water vapor, Moisture, Dynamics, Correlation techniques.

Observed wind and moisture patterns in an extensive squall-line development are used to compute precipitation from a continuity equation for moist air. Horizontal flux of water vapor accounts for about 80 percent of the observed rainfall, and when the local change in water vapor content is included in the moisture balance equation, the computed budget accounts for 95 percent of the actual rainfall production. Factors neglected in the quantitative assessment of the water budget are (1) the transport of water in liquid and solid state and (2) the evaporation from the ground. The results obtained indicate that the agreement between kinematically computed precipitation and observed rainfall improves with the density of rawinsonde observations. Small directional shear in the vertical wind field is proposed as a mechanism for making the squall line an efficient rainfall producer. (Author)

PB-168 477 Field 4B
CFSTI Prices: HC$3.00 MF$0.50

Navy Electronics Lab., San Diego, Calif.
THE NEL T21 MICROBAROGRAPHIC RECORDING SYSTEM.

Research and development rept.,
by C. T. Johnson and J. R. Chiles, Jr. 16 Apr 57, 69p
Rept. no. NEL-773
AD 145 737

Unclassified report

Descriptors: (*Microbarometric waves, Electronic recording systems), (*Electronic recording systems, Meteorological instruments), (*Meteorological instruments, Electronic recording systems), Naval research, Transducers, Power supplies, Amplifiers, Wiring diagrams.

The system consists essentially of three unites: the T21 microphone or transducer, the power supply and amplifier unit, and an Esterline-Angus Graphic Recorder. The equipment has been used most extensively with a pass band extending from periods of about 6 seconds to 6 minutes, but it has also been used to good advantage in the 'sub-turbulence' part of the frequency spectrum in studies of lee waves and in studies of progressive internal waves.

## 05. Behavioral and Social Sciences

N65-22202 Field 5B
CFSTI Prices: HC$2.00 MF$0.50

George Washington Univ., Washington, D. C.
PATENTS FROM GOVERNMENT-FINANCED RESEARCH AND DEVELOPMENT,
by Donald Stevenson Watson and Mary A. Holman.
1964, 44p
Grant NsG 425
NASA CR-56740

Unclassified report

Descriptors: (*Patents, United States Government), (*Research program administration, United States Government).

Patent 3,197,890 Field 5I, 14E

ANIMATED TRANSPARENCY FOR TEACHING FOREIGN LANGUAGES DEMONSTRATOR.
Patent assigned to Navy,
by Ben Lorenz and James W. Barry. 3 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Training devices, Language), Speech, Speech representation, Sound Motion picture projectors, Patents.

The language demonstrator device is adapted for overhead projection. The precise interrelationship of all the organs used to express speech sound may be projected on a screen for either individuals or groups.

Patent 3,204,342 Field 5I, 19E

POLARIZED AND BI-REFRINGENT ANIMATED DISPLAY.
Patent assigned to Navy,
by Ferdinand R. Romano. 7 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Display systems, Training films), (*Bombing, Training films), Photographic projectors, Polarization, Refraction, Simulation, Bombsights, Rocket sights, Patents.

The device is used as a teaching aid to visually present to students the physical concept of the factors involved in bombing and rocketry with their effects on aim. The device visually demonstrates a subject on an overhead projector. Multi-colored configurations are projected that are capable of providing desired animation while maintaining a constant opaque or black background for the projected image. The motions of an aircraft are followed in bombing runs.

PB-168 185 Field 5B, 9B
CFSTI Prices: HC$1.00 MF$0.50

Radio Corp. of America, Bethesda, Md. Data Systems Center.
ON THE SOLUTION OF AN INFORMATION RETRIEVAL PROBLEM,
by Burnett H. Sams. 1963, 9p

Unclassified report

Pub. in Spring Joint Computer Conference, Proceedings v23 p289-97 1963.

Descriptors: (*Information retrieval, Design), Subject indexing, Computer storage devices, Programming-(Computers).

The design and programming of information retrieval systems are discussed. A distinction is made between a document retrieval system, an information retrieval system, and a collating information retrieval system. In the last system, documents are not retained in the principal data store but composites are formed of information extracted from many documents. Among the topics discussed are: indexing schemes (including those that illustrate hierarchical relations); data structure (concerned with storage of information collected on various subjects of interest for a particular information retrieval system); elements of information storage, field and record (the primitive field is the smallest piece of data named and manipulated, while the record is the largest piece of data manipulated as an entity; process of retrieval; programs for processing information; and programming systems for designing, constructing, de bugging, maintaining, and operating computer programs.

PB-168 187 Field 5B, 12B
CFSTI Prices: HC$4.00 MF$0.75

Milton S. Eisenhower Library, Johns Hopkins Univ., Baltimore, Md.
AN OPERATIONS RESEARCH AND SYSTEMS ENGINEERING STUDY OF A UNIVERSITY LIBRARY.
Progress rept.,
by Robert H. Roy, Benjamin F. Courtright, Jr., and Satinder Kumar Mullick. Jun 65, 112p
Grant NSF GN31

Unclassified report

See also PB-163 087.

Descriptors: (*Libraries, Automation), (*Operations research, Libraries), (*Systems engineering, Libraries), Universities, Magnetic tape, Records, Mathematical models, Microfilm, Inventory control, Costs, Stochastic processes, Character recognition, Dynamic programming, Simulation, Nonlinear programming.

Progress is reported that was made by the research team during the previous year on the use study and proposals for circulation and inventory control of the

Johns Hopkins University Library. REPRODUCTION OF THE SHELF LIST ON MAGNETIC TAPE: The SLOT, or Shelf-List-on-Tape activity, included (1) microfilming the shelf list, (2) abstracting the elements desired for each record and producing optically scannable copy by typing them on a typewriter equipped with the font required for scanning, (3) converting the elements to magnetic tape by an optical scanning (character recognition) device, and (4) editing, reformatting, and updating the record cumulated on magnetic tape. Cost for conversion of about 300,000 cards was about $18,170. CIRCULATION CONTROL PROCEDURE: Books for a patron and his identification card (ID) are simultaneously photographed in a jig that presents the call numbers and ID card to a camera, discharges beny photographed similarly. A day's film is presented frame-by-frame to a key-punch operator who prepares a punch card for each transaction. These are processed through a computer to produce daily lists. DECISION RULES FOR ACQUISITIONS AND CATALOGING: Two nonlinear programming and quequeing models were developed for library service centers that fit the description of stochastic systems with dominating fixed costs.

PB-168 327 Field 5B, 9B, 4B
CFSTI Prices: HC$3.00 MF$0.75

UDC Committee, United States National Committee for F. I. D., Washington, D. C.
SAMPLES OF MECHANICALLY PRODUCED SCHEDULES, NUMBER 5, FOR UNIVERSAL DECIMAL CLASSIFICATION (UDC). SINGLE LANGUAGE PRINT-OUTS, 13 LANGUAGES.
App. 8 to System progress rept., Dec 63, by Malcolm Rigby. Jun 64, 90p
Grant NSF GN131

Unclassified report

See also PB-166 412 and -166 413.

Descriptors: (*Classification, Automatic), (*Documentation, Meteorology), Feasibility studies, Astrophysics, Geophysics, Language.

The report is the fifth of a series showing how single or multilingual editions of selected, abridged, special, or full editions of schedules of the Universal Decimal Classification can be compiled and reproduced automatically by computer from punched card or magnetic tape input. The sample shows how the material looks when printed in a single language edition with proper spacing, suppression, and indention. The sample covers section 52 on astrophysics and section 53 on geophysics for the most recent abridged editions in all languages except the Russian, Finnish, and Czech.

PB-168 427 Field 5B, 9B
CFSTI Prices: HC$1.00 MF$0.50

Computer Control Co., Inc., Farmingham, Mass.
A SPECIALIZED LIBRARY INDEX SEARCH COMPUTER, by B. Kessel and A. DeLucia. 1960, 3p

Unclassified report

Proceedings of The Western Joint Computer Conference, San Francisco Calif. p57-9 3-5 Mar 1959.
Prepared in cooperation with Rome Air Development Center, Griffiss AFB, N. Y.

Descriptors: (*Information retrieval, Computers), (*Computers, Information retrieval), (*Subject indexing, Computers), Libraries, Magnetic tape, Computer storage devices, Punched tape, Input-output devices.

Early in 1958, a program was initiated by the Rome Air Development Center for the design and fabrication of an index searcher that was to be tailored specifically to the needs of library documentation. The index searcher will search through large volumes of index data serially and print out the identification of those documents, reports, or graphic materials that satisfy the requirements of the search criteria. The index searcher uses magnetic tape as the storage medium for index data. An index entry is made on the tape for each document, report, or other piece of physical material which is to be made available for rapid automatic searching. An entry might consist of anything from a title to a complete text, depending upon the storage and recovery system to be used. In typical applications the entry made for a given document will consist of a document number, title, author, date, and several descriptors that define the subject matter of the document. (Author)

PB-168 434 Field 5B, 5G, 9B
CFSTI Prices: HC$3.00 MF$0.75

California Univ., Berkeley. Mechanolinguistics Project.
CONCORDANCES FROM COMPUTERS, by Sydney M. Lamb and Laura Gould. 1964, 94p

Unclassified report

Descriptors: (*Vocabulary, Indexes), (*Documentation, Vocabulary), Digital computers, Programming-(Computers), Programming languages, Punched cards, Language.

Contents: Definitions; Three routines (DISCON, UNICON, TRICON); Text format design and keypunching; Restricted and selective concordances; Subsorting of citations (TRICON only); Remake (TRICON only); Parameter card; Control cards and card deck set-up; Final statistics; System adaptations; Description of Procedure; Timing.

PB-168 436 Field 5G
CFSTI Prices: HC$1.00 MF$0.50

Linguistics Research Center, Univ. of Texas, Austin.
AN EXPERIMENT IN AUTOMATIC LINGUISTIC CLASSIFICATION, by Neil Dale and Wayne Tosh. Jul 65, 17p
Rept. no. LRC-65-WSD-1
Grant NSF GN308

Unclassified report

Descriptors: (*Language, Classification), Programming-(Computers), Mathematical analysis, Automatic.

Six paragraphs of English text were syntactically analyzed by computer programs written at the Linguistics Research Center. An experiment was carried out to apply clump theory to this data in order to automatically classify the symbols in the phrase structure rules used in the analysis. The data base, classification technique and results are described in detail. (Author)

PB-168 442 Field 5B, 5I
CFSTI Prices: HC$2.00 MF$0.50

Lehigh Univ., Bethlehem, Pa. Center for the Information Sciences.
CURRICULUM FOR THE INFORMATION SCIENCES. REPORT NO. 4: SYLLABUS FOR UNDERGRADUATE COURSE: THE INFORMATION SCIENCES, by Robert S. Taylor. Aug 65, 26p
Grant NSF GE2569

Unclassified report

See also PB-167 519, -168 439, and -168 454.

Descriptors: (*Documentation, Education), (*Education, Documentation), Communication theory, Cybernetics, Artificial intelligence, Pattern recognition, Classification, Information retrieval, Subject indexing, Vocabulary, Language, Data processing systems, Indexes.

Contents:
Introduction, definitions, cybernetic systems, including organization viewed as communication, and artificial intelligence and pattern recognition
History and sociology of scientific and technical communication: History of scientific communication, present aspects of science and technology, channels of information transfer, classification by purpose, social psychology of scientific communication, from library to procognitive system
Subject analysis: Types, indexing languages, Vocabulary control, classification, automatic subject analysis
Linguistics and language data processing: Approaches to the study of language, language data processing
Information systems and evaluation: Levels of approach to systems, information systems analysis, evaluation of information systems.

PB-168 500 Field 5B, 7-
CFSTI Prices: HC$1.00 MF$0.50

American Chemical Society, Columbus, Ohio. Chemical Abstracts Service.
CAS R AND D ON AN OPERATIONAL, INTEGRATED MAN-MACHINE SYSTEM FOR CHEMICAL INFORMATION.
Final rept. for 1 Jan 31-May 65.
31 May 65, 23p
Grant NSF GN382

Unclassified report

Research supported in part by contract NSF C414.

Descriptors: (*Chemistry, Information retrieval), (*Information retrieval, Chemistry), Indexes, Fluorine compounds, Programming languages, Chemical structure, Data processing systems, Data storage systems, Physical properties, Machine translation, Classification, Standards.

Results from seven Chemical Abstracts Service research areas encompassed by NSF grant support are reported: (1) Input bank and fluorine compendium in machine language; (2) Extending registry capability; (3) Linear notation processing; (4) Substructure searching; (5) Conceptual information processing; (6) Physical properties information handling; (7) Nomenclature translation.

PB-168 544 Field 5B, 9B
CFSTI Prices: HC$2.00 MF$0.50

National Science Foundation, Washington, D. C. Office of Scientific Information.
NON-CONVENTIONAL TECHNICAL INFORMATION SYSTEMS IN CURRENT USE,
comp. by Madeline M. Berry. Jan 58, 47p

Unclassified report

Descriptors: (*Documentation, History), Information retrieval, Subject indexing, Automation, Automatics, Computers, Punched cards.

The report consists of descriptions of technical information systems, embodying new principles for the organization of subject matter or employing automatic equipment for storage and search. The descriptions are arranged alphabetically by organization. The systems may be classified broadly as: (1) Manual systems employing aspect cards--one card per indexing term (e.g. Uniterm or 'peek-a-boo' systems); (2) Mechanized systems employing aspect cards (e.g. coordinate indexing systems used with punched-card equipment or computers); (3) Manual systems employing item cards--one card per item, which may be a document or section of a document (e.g. Keysort systems); (4) Mechanized systems employing item cards (e.g. Zator systems, indexing systems, indexing systems used with punched-card equipment or computers).

PB-168 551 Field 5B, 11F
CFSTI Prices: HC$7.30 MF$2.00

Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
AUTOMATIC PROCESSING OF METALLURGICAL ABSTRACTS FOR THE PURPOSE OF INFORMATION RETRIEVAL. VOLUMES I AND II.
Interim rept. NSF-3,
by Jessica S. Melton. Jul 65,
Grant NSF GN303

Unclassified report

Available as a set only (two volumes).
See also PB-165 972.

Descriptors: (*Metallurgy, Information retrieval), (*Information retrieval, Automatic indexing), (*Automatic indexing, Data processing systems), Abstracting, Programming(Computers), Coding, Dictionaries.

The two volumes of this report display the tools used for analysis, i.e., the dictionary and the rules for analysis, or 'grammar'. The analysis results in structured, search-ready sentences stored on magnetic tape. A sample of these is presented. The objective of this investigation is to develop automatic routines to recognize the metallurgically important words in the text and to indicate their relationships in a searchable structure on a sentence basis and later on a supra-sentence basis.

## 06. Biological and Medical Sciences

AD-405 755 Field 6P, 5J
CFSTI Price: HC$6.00

Army Medical Research Lab., Fort Knox, Ky. Psychology Div.
MIDDLE EAR FUNCTION SEMINAR HELD ON 7-8 MAY 1962,
ed. by John L. Fletcher. 10 May 63, 217p
Rept. no. AMRL-576
Proj. DA3A012001A800

Unclassified report

Descriptors: (*Medical research, Ear), (*Ear, Symposia), Hearing, Diagnosis, Muscles, Contraction, Reflexes, Sound, Acoustics, Auditory nerve, Bone, Conductivity, Physiology, Psychophysiology, Auditory perception, Bats, Cats, Humans.

Presented are the papers given at a seminar held at US Army Medical Research Laboratory, 7-8 May 1962, representing the work of those in the many scientific disciplines aimed at a better understanding of the structure, functioning, and implications for research and diagnosis of middle ear. Papers were delivered by Drs. Charles E. Blevins, O'Dell W. Henson, F. Blair Simmons, J. R. Mundie, Jozef Zwislocki, Mr. Emanuel Mendelson, Drs. Howard Weiss, Michael Loeb, Scott N. Reger, W. Dixon Ward, and Mr. Robert Fleer. The seminar summary was written by Dr. William D. Neff. (Author)

KLX-1869 Field 6H
CFSTI Prices: HC$3.00 MF$0.75

Vitro Engineering Co., New York.
TITLE I ON BULK GRAIN IRRADIATOR.
Preliminary design rept.
27 Jan 65, 68p
Contract AT(30-1)-3389
Unclassified report

Descriptors: (*Irradiated foods, Processing), (*Cereals, Irradiated foods).

NYO-2740-2 Field 6R
CFSTI Prices: HC$6.00 MF$1.25

Columbia Univ., New York. Radiological Research Lab.
ANNUAL REPORT ON RESEARCH PROJECT.
1 Jan 65, 232p
Contract AT(30-1)-2740
Unclassified report

Descriptors: (*Radiobiology, Scientific research).

Patent 3,202,821 Field 6R

FILM BADGE SYSTEM AND METHOD OF USING.
Patent assigned to AEC,
by Leo F. Kocher. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Dosimeters, Design), Health physics instrumentation, Patents.

The dosimeter system is inserted into film badges worn by personnel working at nuclear reactor sites. The dosimeter filter system includes a tantalum filter, an iron filter, a plastic filter and an open window. The plastic filter is an acrylonitrile-butadiene-styrene copolymer.

Patent 3,204,605 Field 6C, 14B

LIVE FISH GRADING APPARATUS.
Patent assigned to Interior,
by Paul E. Vroman. 7 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Fishes, Distribution), Growth, Reproduction(Biology), Patents, Containers, Selection, Separation, Control.

The apparatus has utility in the field of fish culture and hatching propagation of fish. It is particularly adapted for separating small fish into groups according to size. The structure includes two sidewalls, an end-wall and a bottom with adjustable elements which permit the release of fish of predetermined sizes.

Patent 3,205,076 Field 6H

PREPARATION OF MAPLE SIRUP FROM BUDDY SAP.
Patent assigned to Agriculture,
by Aaron E. Wasserman and Charles O. Willits.
7 Sep 65 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Food, Preparation), Carbohydrates, Culture media, Pseudomonas, Patents.

Buddy sap, or buddy maple sirup diluted with water, is inoculated with Pseudomonas geniculata and incubated until all the constituents responsible for buddy flavored sirup have been acted upon. The incubated medium is then evaporated to produce a commercially acceptable maple sirup.

Patent 3,207,154 Field 6Q, 13J

SNORKEL VALVE FOR ESCAPE APPARATUS.
Patent assigned to Navy,
by Patrick J. Rubilotta and Anthony J. Fastaia.
21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Snorkels, Valves), (*Protective masks, Submarine escape), Breathing apparatus, Marine safety equipment, Plastics, Patents.

The valve is used on a face mask of the type used in the escape of personnel from a submerged submarine. The valve has a minimum of projection in front of the mask and is easily operated to open or close the tube to which it is attached. It is largely made of plastics.

Patent 3,207,695 Field 6K, 13J

CHLORATE CANDLE FOR OXYGEN PRODUCTION.
Patent assigned to Navy,
by Paul R. Gustafson. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D. C., 20231, $0.50

Descriptors: (*Life support, Submarines), (*Oxygen, Submarines), (*Chlorates, Life support), Life support, Potassium compounds, Sodium compounds, Patents, Oxygen equipment, Production.

The chlorate candle produces oxygen for use on submarines. It is made of a powder mixture of 85 to 92 percent of sodium chlorate, by weight, 3 to 6 percent of ferrous metal fibers, 3 to 6 percent of barium dioxide, 0 to 6 percent of iron powder and 0.1 to 1 percent of potassium perchlorate.

PB-167 974 Field 6C
CFSTI Prices: HC$7.00 MF$1.75

Chicago Natural History Museum, Ill.
A STUDY OF THE DIURNAL SQUIRRELS, SCIURINAE, OF THE INDIAN AND INDOCHINESE SUBREGIONS,
by Joseph Curtis Moore and George H. H. Tate.
1965, 354p Pub-991
Grants NSF G14265, G4447
Unclassified report

Pub. in Fieldiana: Zoology v48 p1-351 28 May 1965.

Descriptors: (*Rodents, Southeast Asia), Morphology-(Biology), Classification, Distribution, Natural history, India, Ceylon, Thailand, Laos, Burma, Cambodia, China.

Contents: Giant squirrels, genus Ratufa; Indian striped squirrels, genus Funambulus; common tree squirrels, genus Callosciurus; striped tree squirrels, genus Tamiops; plain long-nosed squirrels, genus Dremomys; Indochinese ground squirrel, genus Menetes; Chinese rock squirrels, genus Sciurotamias.

PB-168 428 Field 6D, 9B
CFSTI Prices: HC$1.00 MF$0.50

Librascope Div., General Precision Inc., Glendale, Calif.
A THEORY AND SIMULATION OF RHYTHMIC BEHAVIOR DUE TO RECIPROCAL INHIBITION IN SMALL NERVE NETS,
by Richard F. Reiss. 1963, 23p
Unclassified report

Proceedings of the Spring Joint Computer Conference p171-94 1962.

Descriptors: (*Nervous system, Models(Simulations)), (*Bionics, Nervous system), Nerve cells, Nerve impulses, Neuromuscular transmission, Rhythm(Biology), Fatigue-(Physiology), Adaptation(Physiology), Muscles, Control systems, Digital computers, Analog computers, Pulse generators, Stimulation, Inhibition, Relaxation oscillators, Proprioception.

On the basis of a specific conceptual model of signal processing in neurons, together with some fragmentary arguments and evidence in physiological literature, an elementary theory of a 'multivibrator effect' producible by reciprocally inhibiting neurons is developed. The results of exploratory simulation experiments are described, and speculations on the possible role of the multivibrator effect in semiautomatic muscle control systems are presented. (Author)

PB-168 506 Field 6A, 5B
CFSTI Prices: HC$3.00 MF$0.75

Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
SERIALS RELATING TO BIOCHEMISTRY AND ENDOCRINOLOGY; THEIR IDENTIFICATION AND AN ANALYSIS OF THEIR CHARACTERISTICS.
Communique.
21 Jul 65, 68p
Grant NIH GM11711 02
Unclassified report

Descriptors: (*Biochemistry, Periodicals), (*Indexes, Biochemistry), Endocrine glands, Enzymes, Allergy, Nutrition, Deficiency diseases, Metabolism, Carbohydrates, Fats, Lipids, Proteins, Nucleic acids, Steroids, Biology, Bibliographies, Libraries.

PB-168 507 Field 6C, 6S, 6F
CFSTI Prices: HC$3.00 MF$0.75

Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
EXOBIOLOGY: AN ANNOTATED BIBLIOGRAPHY 1951-1964.
Communique,
comp. by Joe W. Tyson and Ruby W. Moats. Mar 64, 78p
Unclassified report

Descriptors: (*Space biology, Bibliographies), Planetary atmospheres, Mars, Venus, Galaxies, Plants(Botany), Abstracting, Indexes, Subject indexing.

PB-168 511 Field 6M, 6E
CFSTI Prices: HC$2.00 MF$0.50

Abbott Labs., North Chicago, Ill.
DEVELOPMENT OF HIGH TITER ANTIGENS, KILLED VACCINES AND SPECIFIC ANTISERO CONSONANT WITH THE RESEARCH AND DEVELOPMENT OF RHINOVIRUSES.
Semi-annual contract progress rept. for 1 Mar-1 Sep 65,
by Jacob C. Holper. 1 Sep 65, 29p
Contracts PH43 62 487, PH43 63 1125
Unclassified report

Descriptors: (*Viruses, Vaccines), (*ECHO virus, Vaccines), Immunology, Antigens + antibodies, Immune serums, Purification, Preservation, Encapsulation, Viability, Dosage, Tissue culture cells, Chromosomes, Growth, Tables.

Four, fifty liter lots of rhinoviruses have been propagated in WI cells. After appropriate concentration and purification, vaccines will be prepared of each lot for use in man. Normal chromosome patterns were found in three of the four lots of WI cells, and the vaccines produced from these normal cells are in various stages of safety testing. Studies designed to evolve an animal potency test indicate that comparable antibody response can be produced in guinea pigs injected with two, five, or ten ml of rhinovirus vaccine. The potency of a rhinovirus vaccine to guinea pigs was not significantly affected by the dosage schedule. The immunizing activity of rhinovirus vaccines could be concentrated by vacuum dialysis or high speed centrifugation. No stimulation of neutralizing antibody was observed in human volunteers given an inactivated and unconcentrated 33342 vaccine. The vaccine had been shown to be potent in guinea pigs. Further work with this vaccine will be carried out after the virus is concentrated.

PB-168 512 Field 6M, 6E
CFSTI Prices: HC$2.00 MF$0.50

California State Dept. of Public Health, Berkeley. Viral and Rickettsial Disease Lab.
SURVEILLANCE OF VIRAL RESPIRATORY DISEASES AND VACCINE EVALUATION IN A PEDIATRIC POPULATION.
Semi-annual contract progress rept. for 1 Mar-15 Sep 65,
by Edwin H. Lennette. 15 Sep 65, 27p
Contract PH43 63 1141
Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Etiology), (*Vaccines, Respiratory diseases), Immunology, Medicine, Children, Infants, Infectious diseases, Influenza virus, Adenoviruses, Antigens + antibodies, Blood analysis, Diagnosis, Military facilities, Tables, Graphics.

Field studies to determine the prevalent respiratory viruses in the pediatric population at Fort Ord were continued. Viral etiologic studies on all children admitted to the post hospital for an acute respiratory illness and a sample of children seen in the outpatient clinic for milder respiratory illness are being conducted. A longitudinal study of newborn infants, which was established to follow the respiratory disease and infection experience during the first year or two of life, continued. Both of the above studies were designed to establish surveillance mechanisms and to provide background data for future viral respiratory vaccine trials. An evaluation of the filter paper disc method for collecting whole blood for serologic studies in children was completed. A serologic survey to determine antibody levels to selected respiratory viruses by age utilizing the filter paper disc method to collect blood from well children and cord blood samples obtained through the Fort Ord Hospital has been completed. From October 1964 to September 1, 1965, clinical and epidemiological information and laboratory specimens for virologic studies have been collected on 143 hospitalized cases,

563 clinic cases and 118 newborn infants. Laboratory studies have been completed on 117 hospital patients and 355 clinic patients. (Author)

PB-168 513 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Children's Hospital Research Foundation, Columbus, Ohio.
RHINOVIRUS REFERENCE LABORATORY, WHO COLLABORATIVE PROGRAM.
Semi-annual contract progress rept. for 1 Mar-15 Sep 65,
by Vincent V. Hamparian and Henry G. Cramblett.
15 Sep 65, 11p
Contract PH43 65 562

Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Tissue culture cells, Viruses), Immunology, Immune serums, Antigens + antibodies, Etiology, Medicine, Children, Infants.

A total of 43 candidate prototype rhinoviruses have been received from various investigators. Thus far, satisfactory seed stocks for 33 of these viruses have been prepared in HeLa cell cultures. 52 lots of sera for 45 rhinovirus strains have been received. To date, all sera tested in this laboratory appear to possess adequate neutralizing antibody content. An adequate cell bank of WI-38 cells has been prepared to supply roller tube cultures for virus surveillance studies. (Author)

PB-168 514 Field 6M, 6E
CFSTI Prices: HC$2.00 MF$0.50

Children's Hospital Research Foundation, Washington, D. C. Virology Section.
INACTIVATED PARAINFLUENZA TYPE 1, TYPE 2, AND TYPE 3 VACCINES IN INFANTS: ANTIGENICITY, SAFETY.
Annual contract progress rept. for Sep-64 Aug 65,
by Robert H. Parrott. Aug 65, 29p
Contract PH43 62 473

Unclassified report

Descriptors: (*Parainfluenza virus, Vaccines), Immunology, Antigens + antibodies, Embryonated egg technique, Immune serums, Infants, Injection(Medicine), Antigen-antibody reactions, Respiratory diseases, Freezing.

Inactivated viral vaccines for parainfluenza virus types 1, 2 and 3 were prepared in embryonated chicken eggs; type 1 in the allantoic cavity, types 2 and 3 in the amniotic sac. Ten infants received parainfluenza 1; ten received parainfluenza 2; and 16 received parainfluenza 3 vaccine. All infants received two injections at an interval of one month and each infant receiving the parainfluenza 1 and 3 vaccines received an additional injection 41 to 163 days after the second injection. These vaccines were 90% to 100% effective in inducing antibody response. The infants receiving parainfluenza 2 vaccine responded following two injections whereas a majority of those receiving parainfluenza 1 and 3 required the additional injection at a later interval. Infants receiving the parainfluenza 1 virus vaccine developed a complement fixing antibody response to material other than viral protein. There is evidence that this is some component of chicken embryo host which is included in the vaccine when vaccine is prepared in the allantoic cavity. During these studies a micro method for detection of neutralizing antibody seemed to correspond remarkably with the conventional method and was a much simpler and economical method to utilize. During these studies evidence was also obtained to suggest that repeated freezing and thawing caused a detruction of parainfluenza 2 virus neutralizing activity in infant serums. (Author)

PB-168 515 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Children's Hospital, Philadelphia, Pa.
DEVELOPMENT OF A LIVE VACCINE FOR HUMAN INFLUENZA.
Semi-annual contract progress rept. for 15 Apr-15 Sep 65,
by Florence S. Lief. 15 Sep 65, 7p
Contract PH43 64 926

Unclassified report

Descriptors: (*Influenza virus, Vaccines), Immunology, Diseases, Blood serum, Tests, Embryonated egg technique, Storage, Toxicity, Histology, Mice, Humans.

Untoward delays have been encountered in gaining access to the prison population selected for carrying out the initial trails in humans of two live A2 (A2/2946/S+ and A2/2946/S-) vaccine strains developed at Children's Hospital. There is verbal assurance, however, that final permission to use this prison population will be forthcoming shortly and hopefully before the onset of the respiratory season. Thus the project has been concerned chiefly with continuing laboratory studies on: (a) the selection and study of other candidate strains; (b) producing and standardizing reagents which will be needed to carry out suitable serologic procedures (CF, HA-I and hemadsorption-neutralization tests) on the vaccinees; (c) standardizing the methodology for performing hemadsorption-neutralization tests, employing the gamut of Type A and B strains; (d) trying to correlate CF, HA-I and hemadsorption-neutralization test results in various types of human and animal sera; and (e) further examination of the vaccines which have been prepared in RIF-free eggs from the two A2 strains and which are being held in readiness in the frozen state for human administration. Tests for intracerebral toxicity of the vaccines in mice yielded negative results, although search for evidence of histopathologic changes are still incomplete. (Author)

PB-168 516 Field 6M, 6E
CFSTI Prices: HC$2.00 MF$0.50

Communicable Disease Center, Kansas City, Kans.
ACUTE RESPIRATORY INFECTION IN SCHOOL-AGE CHILDREN.
Semi-annual contract progress rept. for 1 Mar-1 Sep 65,
by Tom D. Y. Chin. 1 Sep 65, 26p

Unclassified report

Supported by National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Md.

Descriptors: (*Respiratory diseases, Children), Immunology, Throat, Tissue culture cells, Etiology, Streptococcus, Herpes simplex virus, Parainfluenza virus, Mycoplasma, Adenoviruses, Influenza virus, Acute respiratory disease virus, Antigens + antibodies, Pathology, Tables, Nebraska.

Surveillance of respiratory disease in school-age children is being conducted in three public schools and two children's homes in Omaha, Nebraska. The institution children attend the three schools in the study. During this study period, an average of 3,102 children was followed in the schools. Acute respiratory illness was the most common cause of absenteeism; the average for the three schools was 34.5 percent of all absences. A pharyngeal washing was obtained from 10 percent of the children absent with respiratory disease and tested for pathogenic agents. Group A streptococcus was the most common agent encountered; other pathogenic agents recovered include herpes simplex virus, parainfluenza virus type 1, Mycoplasma pneumoniae, adenovirus type 4, and influenza

virus type A. In the two children's homes an average of 118 children was sampled routinely every 2 months as well as during respiratory illnesses. The illness rate the past 6 months in these homes was considerably lower than that for the first 6 months of the study period. Similar agents were recovered from the homes as found in the schools. Development and application of a microtiter technique for detection of neutralizaing antibodies to respiratory syncytial virus and rhinovirus is described in this report. (Author)

PB-168 517 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Cutter Labs., Berkeley, Calif. Microbiological Research Dept.
RESEARCH AND DEVELOPMENT OF RESPIRATORY DISEASE VACCINES AND HYPER-IMMUNE SERA.
Semi-annual contract progress rept. for 1 Mar-15 Sep 65, by Ralph B. Houlihan and Robert E. Louie. 15 Sep 65, 11p
Contract PH43 63 90, Proj. 113
Unclassified report

Descriptors: (*Respiratory diseases, Vaccines), (*Parainfluenza virus, Antigens + antibodies), Immunology, Immune serums, Absorption, Inhibition, Pepsins, Blood plasma, Immunity, Gamma globulins, Tests.

In initial attempts to develop a CF test for RS antibody it was found that ISG possesses strong anti-complement (AC) activity. The AC activity could be removed by: (1) Treatment with pepsin at pH 4.0 for 20 hours; (2) Repeated absorption with kaolin. The treatment with pepsin did not reduce the HI titers for parainfluenza virus types 1, 2, and 3; however, repeated kaolin absorption reduced the titer considerably. Antibody titers of plasma and ISG were compared before and after absorption with kaolin. It was found that the antibody titers of plasmas are reduced about 4-fold for each virus by one absorption. However, in general the titers of ISG were not reduced. It was also found that the antibody titers of ISG are increased on the average of 19-fold over those of the corresponding plasmas. If all of the antibody is removed in the ISG fraction one expects a 20-fold increase in titer.

PB-168 518 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Flow Labs., Inc., Rockville, Md.
OPERATION OF A SEROLOGY AND TISSUE CULTURE DEVELOPMENTAL LABORATORY.
Semi-annual contract progress rept. for 15 Mar-1 Sep 65, by L. Potash, J. Broyhill, A. Shirai, and B. H. Sweet.
1 Sep 65, 8p
Contract PH43 63 103
Unclassified report

Descriptors: (*Medical laboratories, Tissue culture), (*Tissue culture cells, Growth), Monkeys, Kidneys, Viability, Immunity, Antigens + antibodies, Freezing, Storage, Laboratory equipment, Mycoplasma, Vaccines, Training, Medical personnel, Tests.

Flow Laboratories, Inc. has continued to supply on request specialized as well as routine tissue cultures to members of the NIAID and to personnel of Contracts PH43-64-943 and PH43-64-1169. Studies have been initiated with Dr. Rappaport's tissue methods for growing organ cultures. Preliminary experiments have been carried out on the development of a frozen cell band of African green monkey kidney tissue. There are no definitive results available at this time. The serology laboratory has satisfactorily performed over 300 serological tests for the NIAID and for the field and laboratory studies of the Vaccine Development Program. A number of new personnel are now in training in various aspects of the microtiter technique and with techniques as applied to Mycoplasma. (Author)

PB-168 519 Field 6M, 6E
CFSTI Prices: HC$3.00 MF$0.50

Flow Labs., Inc., Rockville, Md.
DEVELOPMENTAL STUDY RELATING TO THE PREPARATION OF A RESPIRATORY SYNCYTIAL VIRUS VACCINE.
Semi-annual contract progress rept. for 15 Mar-1 Sep 65, by L. Potash, D. Spicer, R. Taschner, and B. H. Sweet.
1 Sep 65, 52p
Contract PH43 64 943
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory disease, Vaccines), Immunology, Tissue culture, Tissue culture cells, Kidneys, Preparation, Dogs, Hamsters, Rabbits, Swine, Mice, Guinea pigs, Bovines, Growth, Storage, Antigens + antibodies, Immunity, Purification, Parainfluenza virus.

The following studies represent the areas investigated during the past six months: Biological Studies: Adaptation and serial passages of various RS strains in different tissue culture systems; Plaque assay technique; Preparation of serological reagents; Developmental studies to improve viral yields; Development of potency assay methods in small laboratory animals; Biochemical and Biophysical Studies: Filtration studies; Concentration and Purification studies; Viral concentrates for oncogenicity testing.

PB-168 520 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Flow Labs., Inc., Rockville, Md.
ONCOGENICITY TESTING OF CANDIDATE VIRAL RESPIRATORY VACCINE STRAINS AND TUMOR REAGENT PROGRAMS.
Semi-annual contract progress rept. for 15 Mar-15 Sep 65,
by B. H. Sweet. 15 Sep 65, 24p Unclassified report
Contract PH43 64 1169

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Vaccines), (*Adenoviruses, Neoplasms), Immunology, Hamsters, Rats, Mice, Antigens + antibodies, Parainfluenza virus, Thyroid gland, Excision, Cells(Biology), Morphology(Biology), Tables.

One hundred and ten viral inocula representing fifty-two strains of candidate respiratory vaccines or potential seed strains have been inoculated into newborn hamsters, rats, and mice. Of these, fifteen inocula representing four adenovirus types (Type 3, 4, 7, and 30) have yielded tumors in hamsters. Viral-induced tumor-specific antigens have been demonstrated only for types 3 and 7 at the present time. Tumors (2) from the Type 4 inocula appear to be 'spontaneous' while no data is currently available for the single Type 30 tumor. Other inocula representing adenovirus types 1, 2, 4, 5, 6, 14, 16, 21, 26, 27; parainfluenza types 1, 2, 3; and respiratory syncytial virus have not thus far yielded tumors. Experiments are in progress to determine if (1) in vitro systems can be used to supplement and extend the in vivo program; (2) thymectomized animals are of value in screening viral materials; (3) the cellular host used for growing virus pools influences oncogenic potential. A tumor virus reagent program has been initiated in order to provide a complete facility for evaluation and documentation of any tumors or cellular transformations which occur. (Author)

PB-168 521 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Hektoen Inst. for Medical Research, Chicago, Ill.

VIRAL RESPIRATORY DISEASE AND IMMUNE RESPONSE IN THE AGED AND IN A PEDIATRIC POPULATION.
Semi-annual contract progress rept. for 1 Mar-1 Sep 65,
by Truman O. Anderson. 1 Sep 65, 10p
Contract PH43 63 76

Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Antigen-antibody reactions), (*Immunity, Respiratory diseases), Immunology, Aging(Physiology), Children, Infants, Medicine, Antigens + antibodies, Blood proteins, Electrophoresis, Blood serum, Tests, Epidemiology, Illinois.

The current report presents preliminary laboratory results on virus isolations from a two month epidemiologic study of infants and children admitted to Cook County Hospital with sever respiratory infections during March, April, and May of this year. The results are tentative and no identification of the agents recovered is reported. The occurence and fluctuation of anti-immunoglobulin antibody in these same infants and children with respiratory disease is noted. Data on the effects of kaolin absorption and periodate treatment of sera from elderly patients is presented with special reference to the influence of such treatments on the anti-globulin levels, the total serum protein, and the serum protein pattern on immunoelectrophoretic analysis. Finally, initial observations on anti-complementary activity of latex FII positive and Waaler-Rose positive sera are discussed. (Author)

PB-168 522 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Lilly (Eli) and Co., Indianapolis, Ind.
STUDIES OF RESPIRATORY SYNCYTIAL VIRUS VACCINES.
Semi-annual rept. for Apr-Aug 65,
by R. N. Hull. Aug 65, 24p
Contract PH43 65 563

Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Vaccines), Immunology, Tissue culture cells, Culture media, Growth, Viability, Temperature, Preparation, Antigens + antibodies, Freezing, Electron microscopy.

A report is made concerning Studies of Respiratory Syncytial Virus Vaccines. Initial studies reported here were concerned with determining the feasibility of an approach, or to establish optimal conditions for obtaining preparations suitable for subsequent studies. Specifically, work was concerned with a comparison of cell cultures, media, incubation temperatures, etc. for optimal propagation of the Long strain of RS virus. Stability of virus harvests, a common problem with biological agents, led to studies designed to preserve the viability of such preparations. Sterile filtration, and inactivation of the virus by means which preserved antigenicity were subject of other experiments in this series. An attempt was made to develop and to perfect a complement fixation test for assay of various virus and vaccine modifications. Concentration of the virus was studied by freeze-thaw techniques using virus-infected cells, and by ultracentrifugation combined with calcium phosphate precipitation of the virus. Zonal ultracentrifugation of virus harvests, an important part of the general approach to this project, was undertaken in a manner to gain preliminary experience since the techniques and equipment employed are relatively new. Some electron microscopy of the RS virus was attempted. (Author)

PB-168 523 Field 6M, 6E
CFSTI Prices: HC$2.00 MF$0.50

National Drug Co., Philadelphia, Pa.

DEVELOPMENT AND PREPARATION OF CONCENTRATED AND PURIFIED VACCINES OF ADENOVIRUSES (TYPES 1, 2, 3, 4, 5 AND 7) AND PARAINFLUENZA VIRUSES (TYPES 1, 2, 3, AND 4).
Semi-annual progress rept. for 1 Mar-15 Sep 65,
by W. J. Thomas and J. L. DeMelo. 15 Sep 65, 39p
Contract PH43 63 79

Unclassified report

Descriptors: (*Adenoviruses, Vaccines), (*Parainfluenza virus, Vaccines), Purification, Storage, Viability, Freezing, Antigens + antibodies, Tissue culture cells, Kidneys, Embryonated egg technique, Skin, Tests.

Stability studies on four experimental type 3 adenovirus vaccines stored at 4C showed good keeping properties for a period of three months. At the end of six months the crude and 20X methanol concentrate showed significant loss in potency, while the 5X methanol and soluble antigen vaccines were unaffected. Similar results were obtained when the four vaccines were lyophilized and stored at 4C. However, in the frozen state (-60C) both methanol concentrates showed a drop in potency after three months, while the crude and soluble antigen vaccines were stable. Attempts to adapt various adenovirus strains to African green monkey kidney met with no success. New attempts are currently being made to passage these strains in African green monkey kidney and diploid cells (WI-38). Master and secondary seeds were prepared for parainfluenza virus types 1, 2 and 3. After having been found free of leucosis, these seeds were used to propagate virus used in a 3X concentrate triple vaccine. The above three types were also concentrated 10X for oncogenicity testing. Attempts are also being made to adapt parainfluenza type 4 (M-25) and respiratory syncytial virus to the embryonated hen's egg. Stability studies on stored parainfluenza 1, 2 and 3 showed no appreciable change for the last six months. Antigen for skin testing was prepared and control testing completed. (Author)

PB-168 524 Field 6M, 6E
CFSTI Prices: HC$2.00 MF$0.50

Pfizer (Chas.) and Co., Inc., Terre Haute, Ind.
A PROGRAM FOR RESEARCH AND DEVELOPMENT OF RESPIRATORY DISEASE VACCINES,
Semi-annual progress rept. for 1 Mar-15 Sep 65,
by Keith E. Jensen. 15 Sep 65, 33p
Contract PH43 63 582

Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Vaccines), (*Vaccines, Medical research), Immunology, Mycoplasma, Parainfluenza virus, Preparation, Antigens + antibodies, Tissue culture cells, Embryonated egg technique, Viability, Dosage, Guinea pigs, Tables.

Clinical trials now underway at several locations employ biological manufactured under this contract including: prototype lots of inactivated vaccines with Mycoplasma pneumoniae, three types of parainfluenza and Respiratory Syncytial virus. Laboratory support is provided upon request. The continuing program towards more effective vaccines has yielded encouraging results with RS virus. Improved filtration steps have reduced losses in antigen during clarification and zinc precipitation has proven to be a highly effective means for concentrating antigen. Pilot vaccines embodying these procedures and monitored for 'A' fraction CF antigen have superior potency in guinea pig tests. Another project has been the development of new vaccine potency tests embodying direct challenge of the vaccinated animal and comparing the level of subclinical infection with that in non-vaccinated controls. Such tests, combined with conventional serological assays, will be related to human responses when results become available from clinical trials with experimental respiratory vaccines. Working with virus strains previously

passaged only in human embryonic kidney, progress has been made in the adaptation of parainfluenza strains of types 1, 2 and 3 to leukosis-free avian cell cultures. (Author)

PB-168 525 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Saint Louis Univ., Mo. Inst. for Molecular Virology.
COMPARATIVE MOLECULAR STRUCTURE OF ONCOGENIC AND NONONCOGENIC ADENOVIRUSES.
Semi-annual progress rept. for 15 Mar-15 Sep 65, by Maurice Green. 15 Sep 65, 19p
Contract PH43 64 928

Unclassified report

Descriptors: (*Adenoviruses, Molecular properties), Molecular structure, Chemical analysis, Physical properties, Vaccines, Proteins, Desoxyribonucleic acids, Nucleotides, Purification, Preparation, Neoplasms, Cancer, Genetics, Humans, Hamsters.

The prototype strains of human adenovirus types 1-28 and 41 vaccine candidate and type 7 strains were cultivated, purified in mg amounts, and analyzed for some of their chemical and physical properties. Each adenovirus type appears to contain only protein and a characteristic amount of DNA ranging from 11.6 to 13.5 per cent DNA. Although highly oncogenic types 12 and 18 possess the lowest amount of DNA, weakly oncogenic types 3, 7, and 21 contain amounts of DNA characteristic of nononcogenic adenoviruses; no simple relationship between oncogenicity and DNA content, therefore, is evident. The buoyant density and thermal denaturation temperature values of the adenovirus DNA's were determined and used to calculate their base compositions. The different adenovirus types contain 48-60% G+C. A correlation was found between base composition and tumorigenicity. Highly oncogenic adenovirus types 12 and 18 possess the lowest G+C content, 48-49 per cent. Types 3, 7, 8, 11, 14, 16, and 21 have somewhat higher G+C contents, 50-53 per cent; of these, type 3, 7, and 21 appear to be weakly oncogenic; we predict that types 8, 11, 14, and 16 will also prove to be weakly oncogenic. The remaining adenoviruses contain 56-60 per cent G+C; none of these have been reported thus far to be oncogenic. The vaccine candidate strains of adenovirus type 1, 2, 3, 4, 7, 16, and 26 examined were similar to the prototype strains with regard to the above characteristics. (Author)

PB-168 526 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

State Univ. of New York, Syracuse. Upstate Medical Center.
VACCINE STUDIES IN A POPULATION OF FAMILIES.
Semi-annual progress rept. for 1 Mar-15 Sep 65, by Harry A. Feldman. 15 Sep 65, 4p
Contract PH43 63 563

Unclassified report

Descriptors: (*Public health, Respiratory diseases), (*Respiratory diseases, Etiology), (*Mycoplasma, Vaccines), Immunology, Throat, Antigens + antibodies, Epidemiology, Immunity, Diagnosis.

A study was completed of the prevalence of pneumococci of various types in the throats of members of a population of families. New HA and HI reactions with M. pneumoniae are described. The tests were applied to a number of populations with results that are rather diverse. No member of the family population under age 15 has antibodies nor did any acquire them in 1964-65. The evaluation of an M. pneumoniae vaccine is under way in participants of the Rheumatic Fever Prophylaxis Clinic. (Author)

PB-168 527 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Tulane Univ., New Orleans, La. School of Medicine.
EXPERIMENTAL RESPIRATORY DISEASE VACCINE STUDIES IN SEVERAL POPULATIONS,

Semi-annual progress rept. for 15 Mar-15 Sep 65, by William J. Mogabgab. 15 Sep 65, 20p
Contract PH43 63 75

Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Vaccines), (*Public health, Respiratory diseases), Immunology, Influenza virus, Parainfluenza virus, Mycoplasma, Herpes simplex virus, Streptococcus, Adenoviruses, Immune serums, Antibiotics, Tissue culture, Diagnosis, Tables.

Respiratory disease surveillance during 1964-65 on the Tulane University Campus showed the usual rates of illness except for an increase in a typical pneumonia cases. Influenza A2 and B accounted for 14 percent of the upper respiratory illnesses and parainfluenza 1, 2, and 3 were associated with 8 percent. Other agents exhibiting serologic responses in significant numbers included Mycoplasma pneumoniae, herpes simplex and respiratory syncytial viruses as well as the K779 and U of C, 179E strains of common cold rhinoviruses. Two-thirds of the common cold type virus isolates were not identified and the remainder were type 1(GL2060) and U of C, 179E. Mycoplasma pneumoniae was obtained from 10 percent of the specimens and almost the same number yielded beta-hemolytic streptococci over half of which were Groups B, C or G. One pneumonia patient exhibited antibody response to influenza B, one with adenovirus, and the other responses were due to M. pneumoniae. Investigations into the significance of calf antiserum neutralization of unidentified common cold viruses revealed lack of reciprocal neutralization by rabbit antisera prepared with these viruses. (Author)

PB-168 528 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Chicago Univ., Ill. Medical School.
EVALUATION OF RESPIRATORY VACCINES IN MEDICAL STUDENT VOLUNTEERS AND A GERIATRIC GROUP.
Semi-annual progress rept. for 1 Mar-1 Sep 65, by Dorothy Hamre and John J. Procknow. 1 Sep 65, 15p
Contract PH43 63 564

Unclassified report

Descriptors: (*Respiratory diseases, Vaccines), (*Viruses, Respiratory diseases), Immunology, Medical personnel, Students, Aging(Physiology), Public health, Antigens + antibodies, Immune serums, Tissue culture cells, Nucleic acids, Ribonucleic acids, Embryonated egg technique, Adenoviruses, Influenza virus, Parainfluenza virus, Herpes simplex virus, Poliomyelitis virus, Mycoplasma.

Respiratory illness among residents of the Drexel Home for the Aged remained at a low level except for one week in early May when there was a small outbreak of colds. No viruses were isolated from these colds. Only one isolation, a rhinovirus belonging to the same serotype as NIH 1200, was made during the entire period. In contrast to the geriatric group, URIs among the medical students at the University of Chicago yielded rhinoviruses. However, the year's total virus isolation rate and the number of rhinoviruses isolated were lower than last year. A new ether-sensitive RNA virus has been isolated during respiratory illness in the student group. (Author)

PB-168 529 Field 6M, 6E
CFSTI Prices: HC$3.00 MF$0.75

Colorado Univ., Denver. Dept. of Medicine and Pediatrics.
RESPIRATORY VIRUS VACCINE EVALUATION AND RESPIRATORY VIRUS SURVEILLANCE, PARTS I AND II.
Semi-annual progress rept. for 1 Sep 64-31 Aug 65,
by Gordon Meiklejohn, C. Henry Kempe, Vincent Fulginiti, and David Rifkind. 31 Aug 65, 64p
Contract PH43 62 477
Sold as a set, parts 1 and 2.
Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Vaccines), Immunology, Influenza virus, Parainfluenza virus, Myxoviruses, Mycoplasma, Herpes simplex virus, ECHO virus, Hepatitis viruses, Adenoviruses, Antigens + antibodies, Agglutinins, Culture media, Etiology, Diagnosis, Skin, Tests, Blood analysis, Immunity, Infants, Children, Tables.

Contents: Continuing evaluation of parainfluenza vaccines: Parainfluenza 3 vaccine; Parainfluenza 1 vaccine; Parainfluenza 2 vaccine; Parainfluenza virus skin testing; Laboratory investigations: Tween-80 and ether treatment of myxoviruses; Comparison of microtiter and macrotiter HI; Mycoplasma pneumoniae; Respiratory virus surveillance; Cold-agglutinin positive pneumonia; Scientific presentations and publications.

PB-168 530 Field 6J, 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Virginia Univ., Charlottesville.
SURVEILLANCE OF RESPIRATORY INFECTIONS IN AN INDUSTRIAL POPULATION.
Annual rept. for 1 Sep 64-31 Aug 65,
by William S. Jordan, Jr., Jack M. Gwaltney, Jr., Gilbert Simon, and J. Owen Hendley. 31 Aug 65, 25p
Contract PH43 63 1128
Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Industrial medicine), (*Industrial medicine, Respiratory diseases), Immunology, Immune serums, Vaccines, Antigens + antibodies, Diagnosis, Tables, Graphics.

Acute respiratory disease in employees of the Eastern Regional Office of the State Farm Insurance Company has been studied for 29 months. Improvement in surveillance has led to the recording of 87% of respiratory symptoms. The attack rate for the past year was 2.2 respiratory illnesses per person per year. Twenty-three percent of these illnesses were sampled, and 25% of the sampled illnesses yielded rhinoviruses. The identification of 37% of all rhinovirus isolates has been accomplished; 21 different serotypes have been encountered. Antisera have been prepared for 24 rhinovirus types, and are near completion for 10 additional types. Two rhinovirus prototype candidates have been characterized. (Author)

PB-168 531 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Washington Univ., Seattle.
PREVENTION OF VIRAL RESPIRATORY INFECTIONS.
Semi-annual rept. for 1 Mar-15 Sep 65,
by J. Thomas Grayston, George E. Kenny, Theodore C. Doege, Kenneth S. Kim, and In-Ho Chu. 15 Sep 65, 10p
Contract PH43 63 562
Unclassified report

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Public health), Immunology, Antigens + antibodies, Mycoplasma, Medicine, Tissue culture cells, Diagnosis.

Surveillance of respiratory infections in a family study revealed that 12% of these 190 infections yielded agents resembling rhinoviruses when tested on two strains of slow-growing human fibroblasts, while none of the 74 well contacts, and only one control culture out of 27 yielded a similar agent. A plague assay for respiratory syncytial virus (RS) was developed and this assay extended to a plague reduction assay for antibody. The plague assay was linear and specific. Plagues appeared at maximum size (1-1.5mm) in 7 days under a methylcellulose overlay medium. Only one human heteroploid cell line out of four tested produced readily recognizable plagues. Comparative assay of antibody to RS virus demonstrated that plague reduction measurements were more sensitive and simpler to perform that tube assay. Transformation of plague reduction data into K values permitted a comparison of antibody levels by tube test and plague reduction. This comparison demonstrated a linear relationship between the two measurement systems. It is concluded that the plague reduction assay described will provide a useful tool for measurement of RS antibody. (Author)

PB-168 532 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Wisconsin Univ., Madison.
RESPIRATORY VACCINE AND SURVEILLANCE STUDIES IN UNIVERSITY OF WISCONSIN FAMILIES.
Rept. for 1 Sep 64-31 Aug 65,
by A. S. Evans, E. C. Dick, Donn D'Alessio and Claire Blumer. 31 Aug 65, 19p
Contract PH43 63 1127
Unclassified report

Available copy will not permit fully legible reproduction.

Descriptors: (*Viruses, Respiratory diseases), (*Respiratory diseases, Vaccines), (*Public health, Respiratory diseases), Immunology, Epidemiology, Etiology, Blood analysis, Parainfluenza virus, Herpes simplex virus, Myxoviruses, Enteroviruses, Coxsackie virus, ECHO virus, Adenoviruses, Pox viruses, Wisconsin.

PB-168 533 Field 6M, 6E
CFSTI Prices: HC$3.00 MF$0.50

Wyeth Labs., Philadelphia, Pa.
TO DEVELOP IMPROVED POLYVALENT ADENOVIRUS VACCINE TO PROVIDE A BASE FOR OTHERS AGAINST VIRAL AGENTS IN RESPIRATORY ILLNESS.
Semi-annual progress rept. for 15 Mar-15 Sep 65,
by Howart Tint and B. A. Rubin. 15 Sep 65, 55p
Contract PH43 63 80
Unclassified report

Descriptors: (*Adenoviruses, Vaccines), (*Viruses, Respiratory diseases), Immunology, Mutations, Viability, Neoplasms, Tissue culture cells, Antigens + antibodies, Tests, Influenza virus, Parainfluenza virus.

The investigation was conducted in three phases: (1) the preparation of inactivated virus vaccines and subunit vaccines made from the dissociation of Adenoviruses: (2) the production and testing of live virus vaccine: (3) a detailed oncogenesis study of Adenoviruses and their hybrids. Monkey kidney adapted strains of Adenovirus Types 1, 2, 3, 4, 5 and 7 were successfully prepared and shown to be free of all extraneous agents. Studies of the dissociated monkey kidney grown vaccines made by alkaline dialysis show that it is possible to retain antigenicity in the absence of live virus. Subunit vaccines were prepared by filtration and by gradient centrifugation in the Zonal Ultracentrifuge. A computer analysis of antigenic characteristics showed that such subunit preparations differ qualitatively from conventional Adenovirus vaccine. The Type 7 Adenovirus hybrid that is highly oncogenic completely loses its tumorigenic properties after alkaline hydrolysis and the removal

of all residual live virus -- in preparations that retain their ability to produce neutralizing antibody. Live-virus vaccines prepared against Influenza and Parainfluenza were completed and safety tested. A number of lots of a new, live diploid-cell-grown Type 4 are in production; additionally, a live monkey-kidney-grown Type 4 Adenovirus vaccine was prepared and tested. (Author)

PB-168 534 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Southwest Foundation for Research and Education, San Antonio, Tex.
PRODUCTION OF ENTEROVIRUS ANTIGENS FOR HUMAN ENTEROVIRUS TYPES.
Semiannual progress rept. for 1 Mar-1 Sep 65, by S. S. Kalter. 1 Sep 65, 7p
Contract PH43 63 1177

Unclassified report

Descriptors: (*Enteroviruses, Antigens + antibodies), (*Immune serums, Enteroviruses), Immunology, Preparation, Purification, Growth, Tissue culture cells, ECHO virus, Coxsackie virus, Immunity, Humans.

The program has a three-fold purpose: (1) to produce reference seeds for Echo viruses 9, 13, 15, 21, 24, 25, 26, 27, 29, 30 and 31 and Coxsackieviruses A-20A, 2, 3, 8, 10, 11, 12, 13 and 16; (2) to produce seed virus and antiserum in rabbits to specific simian viruses, that is SV4, SV5A, SV6, SV26, SV28, SV29, SV35, SV39, SV40 and SV41; and (3) to complete ampouling and testing of the reference seeds.

PB-168 535 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Public Health Research Inst. of the City of New York, Inc.
ADENOVIRUS CHARACTERIZATION AND CLASSIFICATION.
Semi-annual progress rept. for 1 Mar-1 Sep 65, by M. Schaeffer, J. P. Fox, and D. A. Stevens. 1 Sep 65, 7p
Grant PH43AI04161

Unclassified report

Descriptors: (*Adenoviruses, Classification), Immunology, Humans, Animals, Immune serums, Antigens + antibodies, Tissue culture cells, Preparation, Purification, Biological assay.

The adenovirus project is concerned with the characterization and classification of human and animal adenoviruses. Studies involve the development and production of reference antigens and antisera and include investigation into improved methods of culture and assay.

PB-168 536 Field 6M, 6E
CFSTI Prices: HC$3.00 MF$0.75

Parke, Davis and Co., Detroit, Mich.
PREPARATION OF ANTIGENS AND ANTISERA FOR INFLUENZA VIRUS TYPES.
Semi-annual progress rept. for 1 Mar-1 Sep 65, by Frank B. Brandon. 1 Sep 65, 84p
Contract PH43 62 841

Unclassified report

Descriptors: (*Influenza virus, Antigens + antibodies), (*Immune serums, Influenza virus), Immunology, Preparation, Purification, Packaging, Labels, Freeze drying, Embryonated egg technique, Tests, Tables.

Major emphasis was devoted to the completion of the preparation, packaging and testing of all antigen and antiserum pools. Considerable time was spent in compiling summary sheets for the freeze-drying operations for the antiserum pools giving details of each run regarding numbers of ampoules, temperatures, vacuum, sterility test results, individual moisture determinations, etc. Worksheets for all lots of antigens and antisera were prepared. These summarize the historical processing and test data for use in the preparation of the catalog.

PB-168 537 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

Communicable Disease Center, Atlanta, Ga. Viral Reagents Unit.
PRODUCTION OF BWAMBA VIRUS REAGENTS.
Progress rept. for 1 Sep 64-1 Sep 65, by John F. Winn. 1 Sep 65, 10p
Contract PH3905-5

Unclassified report

Descriptors: (*Viruses, Antigens + antibodies), (*Immune serums, Preparation), Immunology, Growth, Body fluids, Tissues(Biology), Brain, Immunity, Mice.

The object of the project is to produce Bwamba virus reagents. Under the contract 850 ml of Bwamba seed virus, 500 ml of normal ascites fluid, 5000 ml of anti-Bwamba virus ascites fluid and unspecified amounts of normal mouse sera and anti-Bwamba virus mouse sera are to be prepared. A special mouse room was prepared. Pilot studies were completed to demonstrate best adjuvant and inoculation schedules. A large pool (1135 ml) of Bwamba virus seed was harvested. Mice from commercial supplies were examined for serological evidence of eight viral agents commonly found in mouse colonies. In addition, a sample of the mice were challenged with LCM to find if there was evidence of previous exposure (there was). (Author)

PB-168 538 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

George Washington Carver Foundation, Tuskegee Inst., Ala.
PRODUCTION OF ENTEROVIRUS ANTISERA.
Semi-annual progress rept. for 1 Mar-1 Sep 65, by R. W. Brown. 1 Sep 65, 14p
Contract PH43 62 180

Unclassified report

Descriptors: (*Enteroviruses, Immune serums), (*Immune serums, Preparation), Immunology, Antigens + antibodies, ECHO virus, Coxsackie virus, Biological assay, Freezing, Immunity, Equines, Tables.

PB-168 539 Field 6M, 6E
CFSTI Prices: HC$1.00 MF$0.50

California State Dept. of Public Health, Berkeley. Viral and Rickettsial Disease Lab.
STANDARDIZATION OF PICORNAVIRUS IMMUNE SERA.
Semi-annual progress rept. for 1 Mar-1Sep 65, by Edwin H. Lennette and Nathalie J. Schmidt. 1 Sep 65, 13p
Contract PH43 62 129

Unclassified report

Descriptors: (*ECHO virus, Immune serums), (*Immune serums, Preparation), Immunology, Biological assay, Enteroviruses, Poliomyelitis virus, Coxsackie virus, Adenoviruses, Purification, Biological contamination, Antigens + antibodies, Tissue culture cells, Public health.

Immune sera to echovirus type 28 and rhinovirus strain 353 prepared in large animal species were assayed for heterotypic neutralizing activity against 58 enteroviruses, 3 reoviruses and 4 rhinoviruses. Most of the heterotypic

titers were low, but some sera had high heterotypic titers for certain reoviruses and a few echoviruses. Bovine immune serum to rhinovirus strain 353 was tested for homotypic neutralizing antibody activity before filtration, before lyophilization and after lyophilization; titers of all 3 samples were 1:128. The final lyophilized serum had high heterotypic titers for echovirus type 9 and certain thinovirus strains. Serum neutralization breakthrough tests for purity were performed on 5 lots of rhinovirus types and 12 lots of echovirus types. The rhinovirus tests are still in progress. All of the echovirus lots except type 24 were found to be pure; echovirus type 24 was contaminated with echovirus type 25. Adenovirus types 19 to 30 prepared by the Public Health Research Institute of the New York City Health Department were tested for homotypic activity in hemagglutination inhibition tests. Hemagglutination of each type tested was inhibited by homotypic immune serum. (Author)

PB-168 540 Field 6M, 6E
CFSTI Prices: HC$3.00 MF$0.50

Baylor Univ., Houston, Tex. Coll. of Medicine.
PREPARATION OF IMMUNE SERUM TO ENTEROVIRUSES.
Semi-annual progress rept. for 1 Mar-1 Sep 65, by Joseph L. Melnick and Bettylee Hampil.
1 Sep 65, 54p
Contract PH43 62 127

Unclassified report

Descriptors: (*Enteroviruses, Immune serums), (*Immune serums, Preparation), Immunology, ECHO virus, Coxsackie virus, Antigens + antibodies, Tissue culture, Growth, Equines, Immunity, Mice, Brain, Tests, Tables.

Samples of original virus fluids of coxsackieviruses A2, 3, 8, 10, 11-13 and echovirus 21, all propagated in human amnion cells, were tested for virus infectivity and identity and released for concentration. Samples of fluids of echoviruses 13, 15, 24, 25, 27 and 29 grown in monkey kidney cells were also released. Echovirus 26 fluid is under test. The following live virus concentrated antigens prepared at SFRE were released for use in the immunization of horses: coxsackieviruses A2, 8, 10-13 and echoviruses 24, 25 and 27. Echo 15 concentrate is under test. Under the program concerned with the preparation of immune serum to 24 enteroviruses, all animals were exsanguinated. Homologous tests for neutralizing antibody were completed in three series of animals (echo 16, 22 and 23). There are now 23 enterovirus sera ready for pooling and final disposition. Special tests on the 24th of the series, echovirus 16, are reported. The pre-baseline sera of horses (Tuskegee) scheduled for immunization against 12 coxsackievirus A antigens and 8 echovirus antigens, 2 horses per antigen, were tested with satisfactory results. Two horses immunized with coxsackievirus A1 (the first mouse-torso-brain antigen) were exsanguinated and homologous testing on all bleedings was completed. Neutralizing antibodies of a useful titer were produced and the sera are available for pooling and final disposition. Third post-inoculation serum samples of the horses inoculated with the other 4 mouse-torso-brain antigens (coxsackie A5, 6, 19 and 22) were received and some have been tested.

PB-168 541 Field 6M, 6E, 5A
CFSTI Prices: HC$2.00 MF$0.50

Baylor Univ., Houston, Tex. Coll. of Medicine.
WORLD HEALTH ORGANIZATION INTERNATIONAL REFERENCE CENTRE FOR ENTEROVIRUSES.
Semi-annual progress rept. for 1 Mar-1 Sep 65, by Joseph L. Melnick. 1 Sep 65, 28p
Contract PH43 63 1174 Unclassified report

Descriptors: (*Enteroviruses, Research program administration), Scientific organizations, Immunology, ECHO virus, Coxsackie virus, St. Louis encephalitis virus, Rubella, Poliomyelitis virus, Arboviruses, Immune serums, Equines, Bovines, Diarrhea, Infants, Tissue culture, Epidemiology, Public health, Pakistan, Texas.

Contents: Coordination of and participation in studies on reference reagents; Testing program on horse sera; Reports on bovine antisera against enteroviruses; Identification and characterization of candidates for new enterovirus types; Investigations on relationship between echovirus types 29 and 32; Differentiation of enteroviral disease from illnesses due to other agents St. Louis encephalitis: Enteroviral disease during the 1964; Houston epidemic of SLE; Rubella; Studies on infantile diarrhea: In Karachi, Pakistan, 1964; In Houston, 1962 and 1963; Participation in the WHO Collaborative Rhinovirus Program; Rhinovirus isolations using human aorta (A-39) cell line in addition to WI-38 (human diploid) and HEK (human embryonic kidney).

PB-168 542 Field 6M, 6E
CFSTI Prices: HC$2.00 MF$0.50

Kansas Univ., Kansas City. Medical Center.
PREPARATION AND DEVELOPMENT OF VIRAL REAGENTS.
Semi-annual progress rept. for 1 Mar-1 Sep 65, by Herbert A. Wenner. 1 Sep 65, 28p Unclassified report
Contract PH43 64 529

Descriptors: (*Enteroviruses, Immune serums), (*Immune serums, Preparation), Immunology, ECHO virus, Coxsackie virus, Adenoviruses, Parainfluenza virus, Influenza virus, Mumps virus, Antigens + antibodies, Purification, Biological contamination, Tissue culture, Storage, Freezing, Diagnosis, Equines, Monkeys, Rabbits, Mice, Humans, Tables.

Reference virus stocks and antisera were prepared for 32 echo-, 23 group A and 6 group B coxsackie, 3 reo- and 5 rhinoviruses. Reference reagents were provided for echovirus 33 (Toluca-3), an accepted candidate. At least 4 new candidates are waiting approval as new serotypes. Two virus stocks were found contaminated with other viruses. These are echovirus types 24 and 32. Studies on antigenic relationships show wide variation amoung strains of echovirus type 30; a significant one-way cross has been found between ECHO-6 antisera and ECHO-30 antigens. Reovirus antisera, obtained by hyperimmunization of monkeys cross extensively both in serum neutralization and hemagglutination inhibition tests. Twenty rhinoviruses were purified by terminal dilution endpoints. Stocks of purified viruses have been prepared for 6, others will be available within 30 to 60 days. Studies are in progress to define serological relationships between certain coxsackie- and simian enteroviruses. (Author)

PB-168 543 Field 6M, 6E
CFSTI Prices: HC$2.00 MF$0.50

Kansas Univ., Kansas City. Medical Center.
PRODUCTION, STANDARIZATION AND PACKAGING OF SEED VIRUSES AND 'MONOTYPIC' MOUSE ASCITES FLUID AND SERUM ANTIBODIES FOR 3 ARBOVIRUSES.
Semi-annual progress rept. for 1 Mar-1 Sep 65, by Herbert A. Wenner. 1 Sep 65, 28p
Contract PH43 64 1155

Unclassified report

Descriptors: (*Arboviruses, Immune serums), (*Immune serums, Preparation), Immunology, Viruses, Body fluids, Antigens + antibodies, Cancer, Hemorrhage, Central nervous system, Mice, Monkeys, Tissue culture, Packaging, Immunity, Tables.

Virus stocks for 3 arboviruses, namely California, Turlock and Sicilian Sandfly have been prepared, titrated and neutralized by homologous antisera. Mice ascertained free of antibodies for 7 murine viruses have been used in pilot studies of (a) ascites formation and (b) antibody responsiveness. Although ascites develops in larger quantities with sarcoma 180 ascites tumor cells, the large yield is complicated by intra-abdominal hemorrhage and tumor development. Ascites obtained with Freund's complete adjuvant, while of smaller volume is clear. Moreover, a significantly greater antibody response was obtained in comparable schedules with Freund's adjuvant than with sarcoma 180. Intramuscular inoculation of monkeys with virus-mineral oil-adjuvant mixtures yielded very good HI responses; the CF responses were equally good, but specific antibodies complexed with those directed toward mouse CNS antigens invalidate, in part at least the usefulness of such sera. Nevertheless with suitable antigens the resultant antisera from monkeys is equal if not superior to that produced in mice. (Author)

PNE-237F Field 6R, 18H
CFSTI Prices: HC$3.00 MF$0.75

California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
FOOD-CHAIN RELATIONSHIPS OF RADIOSTRONTIUM IN THE SEDAN FALLOUT FIELD.
Rept. on Proj. SEDAN,
by William E. Martin and Frederick B. Turner. Mar 65, 74p

Unclassified report

Descriptors: (*Radiological contamination, Food), (*Biological contamination, Radioactive fallout).

RFP-446 Field 6R
CFSTI Prices: HC$2.00 MF$0.50

Rocky Flats Div., Dow Chemical Co., Golden, Colo.
EVALUATION AND TREATMENT OF AN ACUTE INTERNAL EXPOSURE TO PLUTONIUM.
8 Mar 65, 29p CONF-650302-6
Contract AT(29-1)-1106

Unclassified report

Prepared from IAEA Symposium on Personnel Dosimetry for Accidental High-Level Exposure to External and Internal Radiation, Vienna.

Descriptors: (*Plutonium, Radiation injuries), (*Radiation injuries, Therapy).

RLO-1754-1 Field 6R
CFSTI Prices: HC$2.00 MF$0.50

Oregon Univ., Portland. Medical School.
THE EFFECT OF RADIATION ON MEMBRANE METABOLISM AND ACTIVE TRANSPORT.
Comprehensive progress rept.,
by John T. Van Bruggen. 1965, 28p
Contract AT(45-1)-1754

Unclassified report

Descriptors: (*Metabolism, Radiation effects).

TID-21827 Field 6F, 2D
CFSTI Prices: HC$3.00 MF$0.75

Ohio State Univ., Columbus. Dept. of Botany and Plant Pathology.
BIOCLIMATIC AND SOILS INVESTIGATIONS IN FOREST ENVIRONMENTS. VI. GROSS PRECIPITATION AND THOUGHFALL STUDIES AT NEOTOMA,
by Victor L. Riemenschneider. Aug 64, 73p
Contract AT(11-1)-552

Unclassified report

Prepared in cooperation with Ohio Agricultural Experiment Station, Wooster.

Descriptors: (*Atmospheric precipitation, Agriculture), (*Agriculture, Atmospheric precipitation), (*Ecology, Agriculture).

## 07. Chemistry

AD-404 843 Field 7D, 11I, 14B
CFSTI Price: HC$1.00

Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Nonmetallic Materials Lab.
POLYMERIZATION KINETICS BY MEANS OF DIFFERENTIAL THERMAL ANALYSIS. PART I. APPARATUS.
Technical documentary rept.,
by W. E. Gibbs and K. R. Fisch. Apr 63, 9p
ASD-TDR-63-156, pt. 1
Proj. 7340, Task 734004

Unclassified report

Descriptors: (*Polymerization, Reaction kinetics), (*Reaction kinetics, Measurement), (*Calorimeters, Design), (*Nitriles, Decomposition), Thermochemistry, Instrumentation, Calibration, Heat of reaction.

A differential thermal analysis (DTA) apparatus was designed to determine kinetic and thermodynamic data from polymerization reactions. The apparatus was calibrated and the decomposition rate of azobisisobutyronitrile was determined. The data obtained are in good agreement with those reported in the literature. (Author)

AD-450 679 Field 7D, 11F
CFSTI Price: HC$1.00

Union Carbide Research Inst., Tarrytown, N. Y.
MASS SPECTROMETRIC STUDY OF THE OXIDATION OF TUNGSTEN.
Technical rept.,
by P. O. Schissel and O. C. Trulson. Oct 64, 25p
Rept. no. UCRI-2787-TR-C-26
Contract DA30 069ORD2787
N65 15020

Unclassified report

Descriptors: (*Tungsten, Oxidation), (*Reaction kinetics, Tungsten), Mass spectroscopy, Spectrum analyzers, Tungsten compounds, Oxides, Chemical reactions, Surfaces, High-temperature research, Low-pressure research, Adsorption, Surface temperatures, Ions.

A mass spectrometer has been used to study the kinetics of the oxygen-tungsten reaction over the temperature range 1400K to 3150K at oxygen pressures as high as 0.0002 torr. The main products of chemical reaction are identified as W3O9, W2O6, WO3, and WO2; their intensities are given as a function of surface temperature and oxygen pressure. At high surface temperatures, atomic oxygen is observed in an abundance comparable to the impingement rate of molecular oxygen on the surface. These observations lead to a reaction mechanism involving two types of oxygen on the surface, the first tightly bound with a desorption energy near 144 kcal/mole, the second more loosely bound with a desorption energy near 114 kcal/mole. A detailed kinetic model is proposed to account for the observations. (Author)

BNWL-12 Field 7B
CFSTI Prices: HC$1.00 MF$0.50

Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
CHROMATOGRAPHIC ANALYSIS OF HELIUM CONTAINING TRACE IMPURITIES,
by D. W. Shannon. Nov 64, 18p
Contract AT45 1 1830

Unclassified report

Descriptors: (*Helium, Chromatographic analysis).

GA-5978 Field 7E, 18M
CFSTI Prices: HC$3.00 MF$0.75

General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
UTILIZATION OF REACTOR FAST NEUTRONS FOR ACTIVATION ANALYSIS.
Annual rept. no. 2, for period ending 30 Nov 64,
by H. P. Yule, H. R. Lukens, Jr., and V. P. Guinn.
14 Dec 64, 90p
Contract AT(04-3)-167

Unclassified report

Descriptors: (*Radioactivation analysis, Fast neutrons), (*Fast neutrons, Radioactivation analysis), Research reactors.

MSAR-65-58 Field 7B
CFSTI Prices: HC$1.00 MF$0.50

MSA Research Corp., Callery, Pa.
DEVELOPMENT OF TECHNIQUE FOR MEASUREMENT OF IMPURITIES IN SODIUM.
Progress rept. for Apr 65.
14 May 65, 15p Rept. no. 56-1
Contract AT(11-1)-765

Unclassified report

Descriptors: (*Sodium, Impurities), (*Impurities, Sodium), Determination.

N65-22548 Field 7D, 20H
CFSTI Prices: HC$2.00 MF$0.50

Florida Univ., Gainesville.
THEORY OF INTERNAL RELAXATION IN CHEMICAL KINETICS.
Preprint No. 66,
by G. Ludwig Hofacker. 15 Jan 65, 46p
Grant NsG-512
NASA CR-62397

Unclassified report

Descriptors: (*Isomeric transitions, Reaction kinetics), Theory.

Patent 3,202,479 Field 7A, 18J

SEPARATION OF RUTHENIUM FROM AQUEOUS SOLUTIONS.
Patent assigned to AEC,
by Joseph J. Katz. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Ruthenium, Separation), Solvent extraction, Fission production, Solutions, Acids, Ruthenium compounds, Oxides, Nitrates, Uranium compounds, Plutonium compounds, Salts, Gases, Oxidation, Catalysts, Ozone.

The process is useful in the recovery of ruthenium from solutions containing uranyl nitrate or other uranium salts and plutonium salts. An oxidation catalyst is added to the solution and ozone is introduced in a concentration of at least 0.5 percent by weight whereby ruthenium tetroxide is formed and volatilized.

Patent 3,202,744 Field 7A

METHOD OF BRIQUETTING.
Patent assigned to TVA,
by James C. Barber, George H. Megar and Thomas S. Sloan. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Binders, Ores(Nonmetallic), (*Phosphorus, Separation), Patents, Wastes-(Industrial), Phosphates, Carbon, Silicon compounds, Dioxides, Centrifuge separation, Material forming.

A mixture of phosphorus-bearing rock, carbon, and silicon is briquetted by the method. Sludge from a phosphate rock smelting operation is introduced in a vessel and centrifugal forces are applied to the sludge. An overflow of phosphorus (less than 7 percent), a water slurry containing solids and carbonaceous material is removed from the vessel. The water slurry is settled in a second vessel. A supernatant water and a wet residue is removed from the second vessel. The wet residue is mixed as a binder with the phosphorus-bearing rock, carbon, and silica and the mixture is briquetted.

Patent 3,202,992 Field 7G

INTERFEROMETER SEEKER.
Patent assigned to Navy,
by Robert L. Kent and Joseph C. Nowell. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Terminal guidance, Guided missiles), (*Interfometers, Homing devices), Detectors, Target acquistion, Patents, Guided missile antennas, Scanning.

The interferometer seeker is for use in a ram-jet missile to provide semiactive terminal guidance. Multiple antenna arrays improve angular resolution to afford better performance in the presence of clutter, multiple targets, and noise jamming. The seeker provides a direct measure of target lead or bearing angle in thepitch and yawplanes to furnish a correction for the variation of angular rate sensitivity with the target position.

Patent 3,207,796 Field 7C

PREPARATION OF NITROALKYL CHLORIDES.
Patent assigned to AEC,
by Theodore M. Benziger and Robert K. Rohwer.
21 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Organic nitrogen compounds, Chlorides), (*Chlorides, Organic nitrogen compounds), Synthesis-(Chemistry), Plasticizers, Solvents, Alcohols, Substitution reactions.

The nitroalkyl chlorides are useful as plasticizers, solvents, chemical intermediates, and as components of high explosive compositions. They are prepared by reacting sulfuryl chloride with a lower beta-nitroalkyl alcohol in the presence of a tertiary organic base such as pyridine. The alcohol may be 2,2-dinitropropanol.

PB-168 072 Field 7D
CFSTI Price: MF$1.00

National Bureau of Standards, Washington, D. C.
MICROWAVE SPECTRAL TABLES. VOLUME I: DIATOMIC MOLECULES.
Monograph,
by Paul F. Wacker, Masataka Mizushima, Jean D. Peterson, and Joe R. Ballard. 1 Dec 64, 161p
Monograph NBS-M-70, vol. 1
Unclassified report

Available in hard copy from Superintendent of Documents, GPO, Washington, D. C., 20402, $2.00, as C-13.44:70.

Descriptors: (*Diatomic molecules, Microwave spectroscopy), (*Microwave spectroscopy, Tables), Line spectrum, Molecular properties, Frequency, Intensity, Chemical bonds, Dipole moments, Atomic orbitals, Hyperfine structure.

For about 1500 spectral lines of diatomic molecules observed by coherent radiation techniques, measured frequencies, assigned molecular species, assigned quantum numbers, and newly computed intensities are given. Molecular data, such as rotational constants, dipole moments, and various coupling constants, determined by such techniques, are also tabulated, as are other molecular constants used in the intensity computations. References are given for all included data. For determination of hyperfine spectra, both Casimir's function and the intensity splitting factor are given for both integral and half-integral quantum numbers J and I, permitting application to additional molecules with unclosed electronic shells and with hyperfine splitting produced by more than one nucleus. (Author)

PB-168 469 Field 7D, 7C
CFSTI Prices: HC$3.00 MF$0.75

Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
KINETICS AND MECHANISM OF DIMETHYLZING PYROLYSIS (Cinetique et Mecanisme de la Pyrolyse du Dimethylzinc).
Doctoral thesis,
by Irma Lambert. 1965, 57p Rept. no. CEA-R-2716
Unclassified report

Text in French, attached summary in English.

Descriptors: (*Zinc compounds, Metalorganic compounds), (*Metalorganic compounds, Pyrolysis), (*Pyrolysis, Reaction kinetics), Heat of activation, Organic solvents, Cyclohexanes, France.

A study was made of the pyrolysis of dimethylzinc in sealed bulbs between 250 and 400C with and without cyclohexane, one or other of the reactants being completely deuterated. It is shown that the following mechanisms occur: (1) CH3Zn CH3 to CH3 + Zn CH3; (2) CH3 + C6H12 to CH4 + C6H11; (3) 2 CH3Zn to 6(CH3Zn)2 which decomposes to give methane. The activation energy was calculated for step 1: E1 = 45.5 ± 3.3 Kcal/mole. The study of the reaction in the absence of cyclohexane made it possible to show that it is not a chain reaction; also the lower limit of the activation energy for the reaction: (4) CH3 + CH3Zn CH3 yields CH4 + CH2Zn CH3 was calculated. It was found that E > or = 15 Kcal/mole. (Author)

PB-168 472 Field 7D, 7B, 20B, 7E
CFSTI Prices: HC$2.00 MF$0.50

Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ANISOTROPY OF THE FLUORINE CHEMICAL SHIFT TENSOR IN UF6 (Anisotropie du Tenseur de Deplacement Chimique des Fluors dans uf6),
by Paul Rigny. Aug 65, 35p Rept. no. CEA-R-2827
Unclassified report

Text in French, summary in English.

Descriptors: (*Uranium compounds, Fluorides), (*Fluorides, Magnetic resonance), (*Magnetic resonance, Tensor analysis), Crystal structure, Line spectrum, Chemical bonds, Atomic energy levels, Anisotropy.

An F19 magnetic resonance study of polycristalline UF6 is presented. The low temperature complex line can be analyzed as the superposition of two distinct lines, which is attributed to a distorsion of the UF6 octahedron in the solid. The shape of the two components is studied. Their width is much larger than the theoretical dipolar width, and must be explained by large anisotropies of the fluorine chemical shift tensors. The resulting shape functions of the powder spectra are determined. The values of the parameters of the chemical shift tensors yield estimates of the characters of the U-F bonds, and this gives some information on the ground state electronic wave function of the UF6 molecule in the solid. (Author)

PB-168 473 Field 7B, 18J
CFSTI Prices: HC$2.00 MF$0.50

Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
COMPARISON OF SPECTROGRAPHIC ANALYSIS METHODS FOR PLUTONIUM AND ITS COMPOUNDS. (Comparaison des Methodes Spectrographiques d'Analyse du Plutonium et de ses Composes),
by Michel Chaput and Jacques Robichet.
Sep 65, 36p Rept. no. CEA-R-2869
Unclassified report

Text in French, summary in English.

Descriptors: (*Spectroscopy, Plutonium compounds), (*Plutonium compounds, Impurities), Plutonium, Distillation, Sparks, Graphite, Chemical analysis, France.

Two spectrographic analysis methods are described for dosing impurities in compounds containing plutonium or its salts: Distillation method with a carrying-over agent; Spark method in graphite electrodes. Test results concerning factors which may be considered responsible for the discrepancies observed are given in an appendix. All the comparisons have been carried out on samples taken in such a way as to ensure a perfect homogeneity and to make it possible to study separately the parameter in question: Influence of the internal standard; Influence of the carrying-over agent; Influence of the conditions used for separating the plutonium and of the purity of the reagents. (Author)

RL-SA-33 Field 7B
CFSTI Prices: HC$1.00 MF$0.50

Hanford Atomic Products Operation. Richland, Wash.
QUANTITATIVE DETERMINATION OF PLUTONIUM OXIDATION STATES IN VARIABLE NITRIC ACID SOLUTIONS FOR CONTROL LABORATORIES--SPECTROPHOTOMETRIC,
by Curtis A. Colvin. 4 May 65, 8p CONF-650613-2
Contract AT(45-1)-1350 Unclassified report

Prepared from American Chemical Society, (20th) Northwest Regional Meeting, Corvallis, Ore.

Descriptors: (*Plutonium, Quantitative analysis), (*Spectrophotometers, Plutonium).

TID-21811 Field 7C
CFSTI Prices: HC$4.00 MF$1.00

Fordham Univ., New York.
THERMODYNAMIC STUDIES OF SOME CHELATES IN MIXED SOLVENTS.
Doctoral thesis,
by Ahmad Dadgar. 5 Mar 65, 113p
Contract AT(30-1)-906
Unclassified report

Descriptors: (*Complex compounds, Thermodynamics), (*Organic compounds, Complex compounds).

## 08. Earth Sciences and Oceanography

CU-2663-22 Field 8C
CFSTI Prices: HC$2.00 MF$0.50

Lamont Geological Observatory, Palisades, N. Y.
RESPONSE OF DYE TRACERS TO SEA SURFACE CONDITIONS,
by B. Katz, R. Gerard, and M. Costin. Jun 65, 30p
Contract AT30 1 2663
Unclassified report

Descriptors: (*Markers, Ocean currents), (*Ocean currents, Markers).

Patent 3,198,171 Field 8A

ARTIFICIAL HABITAT AND METHOD FOR THE GROWTH AND STUDY OF DEEP SEA MARINE ORGANISMS.
Patent assigned to Navy,
by James A. Westphal. 3 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Marine biology, Ecology), (*Pressure vessels, Marine biology), Simulation, Sea water, Patents, Tanks(Containers), Growth, Closed ecological systems, Aquatic animals.

The apparatus is for the study and observation of deep sea biota. The pressurized growing vessel is designed to facilitate growth experiments under open sea pressurization. A control device is provided for flow control of the sea water passing through the pressurized system. (Author)

PB-168 446 Field 8E, 22B
CFSTI Prices: HC$1.00 MF$0.50

Aeronautical Chart and Information Center, St. Louis, Mo.
THE ACIC ROLE IN PROJECT ANNA,
by Thomas C. Finnie. Mar 63, 8p
Technical paper no. ACIC-TP-4
Unclassified report

Descriptors: (*Geodesics, Scientific satellites), Data processing systems, Optical equipment, Photographic equipment, Photographic plates.

The intent of this paper is to present the role of the Aeronautical Chart and Information Center in the Project ANNA optical program. The discussion includes a description of the processes involved in the reduction of photographic plates which include locating the satellite flashes, identifying stars, measuring plates, reducing time tapes and computing the apparent position of the satellite flashes. (Author)

PB-168 457 Field 8M, 13B
CFSTI Prices: HC$2.00 MF$0.50

Johns Hopkins Univ., Baltimore, Md. Dept. of Civil Engineering.
A CRITICAL REVIEW OF SELECTED LITERATURE RELATING TO THE VIBRATORY CUTTING, PENETRATION AND COMPACTION OF SOILS,
by Stephen C. Cowin, Robert L. Kondner, and Robert S. Ayre. 1 Apr 58, 43p Technical rept. no. TR-4
Contract DA22 079eng210
AD 200 148
Unclassified report

Descriptors: (*Soil mechanics, Reviews), Loading-(Mechanics), Mechanical properties, Compressive properties, Penetration, Soils, Vibrators(Mechanical), Foundations(Structures), Civil engineering.

This report is a critical review of the literature in soil mechanics, soil physics, engineering and agriculture, relating to the vibratory cutting, penetration and compaction of soils. The literature references were previously collected and reported. However some new material has come to light and it is freely used in this review. The bibliography at the end of the report contains all the references used herein. These references were selected on the basis of outstanding and/or historical interest, or as typical examples of the literature. The order of this discussion is from the general literature to the specific reference dealing with a subject of the review. Thus the discussions of soil behavior under dynamic loading and soil-problem modeling are followed by the discussions of vibratory cutting, penetration and compaction of soil. A review of the literature on vibrated concrete that may be of interest to the principle subjects of this report closes the critical discussion. (Author)

UCRL-12327 Field 8K, 18C
CFSTI Prices: HC$2.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
NUCLEAR DECOUPLING, FULL AND PARTIAL,
by Dan W. Patterson. 26 Mar 65, 32p
CONF-650422-1
Contract W-7405-eng-48
Unclassified report

Presented at American Geophysical Union, Program for Section of Seismology Annual Meeting, Washington, D. C.

Descriptors: (*Nuclear explosions, Seismic waves), (*Seismic waves, Underground explosions).

## 09. Electronics and Electrical Engineering

AD-404 040 Field 9E
CFSTI Prices: HC$4.00

Stanford Research Inst., Menlo Park, Calif.

MICROWAVE FILTERS AND COUPLING STRUCTURES.
Final rept. for 30 Sep-31 Dec 62; Summary rept. for 1 Jan 61-31 Dec 62,
by G. L. Matthaei, B. M. Schiffman, E. G. Cristal, and L. A. Robinson. Feb 63, 124p
Contract DA36 039SC87398, Projs. DA3A99 15 002 02 06, SR13527

Unclassified report

Descriptors: (*Waveguide filters, Microwave equipment), (*Coupling circuits, Microwave equipment), (*Microwave equipment, Waveguide filters), Resonators, Tuned circuits, Band-pass filters, Multiplex, Ferromagnetic materials, Coaxial filters, Low-pass filters, Broadband, Capacitance.

A two-resonator waveguide magnetically tunable filter and a two-resonator strip-line magnetically tunable filter are described. These filters utilize ferrimagnetic resonance in single-crystal yttrium-iron-garnet (YIG) to achieve tuning which is controlled by a biasing dc magnetic field. Previous work on the exact design of band-stop filters is extended to cover additional strip-line (or coaxial) configurations which have practical advantages. The experimental results of a trial, three-channel multiplexer using comb-line filters are discussed. Design equations are presented for wideband, interdigital band-pass filters having capacitive loading at one end of each resonator line, and a short circuit at the other. The use of capacitive loading is seen to permit even more compact filter structures, and causes the first spurious response to be unusually far removed from the main pass-band.

AD-452 115 Field 9E, 9L
CFSTI Price: HC$2.00

Harry Diamond Labs., Washington, D. C.
AN RC TIME CONSTANT MULTIPLYING CIRCUIT,
by Ronald J. Reyzer. 10 Jun 64, 42p
Rept. no. TR-1234
Projs. DA1P523801A300, 46300

Unclassified report

Descriptors: (*Frequency multipliers, Tuned circuits), (*Relaxation oscillators, Tuned circuits), (*Tuned circuits, Relaxation oscillators), Resistors, Capacitors, Packaging, Electronic switches, Transistors, Diodes-(Semiconductor).

A circuit capable of multiplying the RC time constant of a relaxation oscillator has been designed to achieve long periods with small values of R and C. The circuitry required to perform the time multiplication can be packaged in a small volume. In many applications, the extra space required for the circuitry is much smaller than that required for higher value RC combinations of a standard circuit for an equivalent time. The multiplication operation is realized by adding a simple circuit to the basic RC oscillator, using small and stable components. This circuit is an electronic switch that interrupts the capacitor-charging current of the basic RC oscillator in a fixed manner. This fixed interruption, controlled by a few stable components, determines the multiplying factor applied to the basic RC oscillator. (Author)

AP-NOTE-434 Field 9B, 18L
CFSTI Prices: HC$3.00 MF$0.75

Alco Products, Inc., Schenectady, N. Y. Nuclear Power Engineering Dept.
MANUAL OF PROCEDURES FOR OPERATION OF REACTOR ENGINEERING CODES AT ALCO,
by R. L. Caton, R. Zielinski, and J. M. Corkery.
26 Jun 62, 62p
AT30 1 2639

Unclassified report

Descriptors: (*Programming(Computers), Instruction manuals), (*Reactor operation, Programming(Computers)).

BNWL-41 Field 9B
CFSTI Prices: HC$1.00 MF$0.50

Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
LISTIV: A FORTRAN IV GENERALIZED INPUT ROUTINE,
by D. D. Matsumoto. Mar 65, 17p
Contract AT45 1 1830

Unclassified report

Descriptors: (*Programming(Computers), Programming languages), (*Programming languages, Programming-(Computers)).

N65-22355 Field 9A
CFSTI Prices: HC$1.00 MF$0.50

General Electric Co., Schenectady, N. Y. Microwave Tube Business Section.
DEVELOPMENT OF HIGH TEMPERATURE, GAS FILLED, CERAMIC RECTIFIERS, THYRATRONS, AND VOLTAGE-REFERENCE TUBES.
Quarterly progress rept. no. 1, 15 Dec 64-14 Mar 65,
by E. A. Baum. 1965, 19p
Contract NAS3 6469
NASA CR-54372 G-E-SD-514A

Unclassified report

Descriptors: (*Ceramic materials, Electron tubes), (*Electron tubes, Ceramic materials), Rectifiers, Thyratrons.

N65-22372 Field 9A
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Schenectady, N. Y. Microwave Tube Business Section.
DEVELOPMENT OF HIGH-TEMPERATURE, HIGH-CURRENT, ALKALI-METAL, VAPOR-FILLED CERAMIC THYRATRONS AND RECTIFIERS.
Quarterly progress rept. no. 3,
by A. W. Coolidge. 23 Mar 65, 37p
Contract NAS3-6005
NASA CR-54365

Unclassified report

Descriptors: (*Thyratrons, Ceramic materials), (*Rectifiers, Ceramic materials).

N65-22559 Field 9A, 20L, 9C
CFSTI Prices: HC$3.00 MF$0.75

TRW Space Technology Labs., Redondo Beach, Calif.
X-BAND SOLID STATE SIGNAL SOURCE.
Special rept.,
by C. B. Coulbourn. 15 Jan 65, 70pSTL-8411-6003-RU-000
Contract NAS8-5205
NASA CR-62380

Unclassified report

Descriptors: (*Signal generators, Solid state physics), (*Solid state physics, Signal generators).

N65-23065 Field 9E, 20I
CFSTI Prices: HC$2.00 MF$0.50

Illinois Univ., Urbana. Dept. of Electrical Engineering.
FINITE AND INFINITE H-PLANE BIFURCATION OF WAVEGUIDE WITH ANISOTROPIC PLASMA MEDIUM,
by S. W. Lee, Y. T. Lo, and R. Mittra. Mar 65, 31p

Rept. nos. Antenna Lab. 65-7, SR-4
Grant NsG-395
NASA CR-62470

Unclassified report

Descriptors: (*Waveguides, Separation), (*Plasma medium, Waveguides).

N65-23225 Field 9B
CFSTI Prices: HC$3.00 MF$0.75

Mass. Inst. of Tech., Cambridge. Research Lab. of Electronics.
OPTIMUM QUANTIZATION.
Technical rept. no. 429,
by James D. Bruce. 1 Mar 65, 76p
Contract DA-36-039-AMC-03200(E), Grant NsG-496
NASA CR-62742

Unclassified report

Descriptors: (*Analog-to-digital converters, Optimization), (*Optimization, Analog-to-digital converters).

Patent 3,198,993 Field 9A

COINCIDENCE GATE GENERATOR.
Patent assigned to Navy, Unclassified patent
by David Sigel. 3 Aug 65
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Gates(Circuits), Training devices), (*Training devices, Radar), Simulators, Aircraft, Radar targets, Correlators, Electronic equipment, Patents.

The coincidence gate circuit is used in a radar simulator. The circuit is adaptable for use on different types of comparison systems for comparing target and antenna scan angles. Simple electronic circuitry is used. The circuit operates for large variations in magnitude of input signals. A multiplicity of signals are compared and an output is provided only when all input signals coincide.

Patent 3,199,014 Field 9A

MINIMUM ERROR DETECTING CIRCUIT.
Patent assigned to Air Force,
by Franz L. Putzrath. 3 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Pattern recognition, Errors), (*Discriminators, Errors), Circuits, Condensers, Resistors, Patents.

The circuit determines when an error signal, or any complex voltage wave, reaches a minimum value. It is utilized in pattern matching systems such as character recognizers. The circuit includes an error voltage source, a direct current source. The error voltage source, a resistor, a charged condenser and a diode are connected in a series circuit in the operating position. The circuit is initially conditioned by throwing a switch to charge the condenser.

Patent 3,199,051 Field 9A

OSCILLATOR WITH FREQUENCY MODULATING IRON CORE REACTOR.
Patent assigned to Navy,
by Richard A. Hills and Frank C. De Bolt.
3 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Oscillators, Tuned circuits), Transistors, Potentiometers, Transformers, Resistors, Capacitors, Electronic equipment, Patents.

The voltage-controlled oscillator is frequency controllable with an input signal. The components include an NPN transistor, two potentiometers, a metal core transformer, two capacitors and resistors.

Patent 3,202,015 Field 9E, 17I

RADAR ANTENNA POSITIONING DEVICE.
Patent assigned to Navy,
by George E. Moul, Jr., and Robert W. Fowler.
24 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Radar antennas, Drives), Worm gears, Antenna components, Patents.

The antenna mount includes an antenna element having a pair of mutually perpendicular, arcuate drive members pivotally attached thereto. The antenna is pivotally mounted on a support post, and the arcuate drive members are driven by motors mounted on a base to which the support post is attached, the arcuate members having gear teeth on their external surfaces which mesh with worm gears on the output shafts of the drive motors.

Patent 3,202,809 Field 9B

ANALOG MULTIPICATION AND DIVISION CIRCUIT USING A HALL EFFECT MULTIPLIER.
Patent assigned to Navy,
by Raymond L. King, Jr., and Robert L. Conger.
24 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Analog computers, Circuits), (*Hall effect, Analog computers), Patents.

The electronic analog computer circuit is for obtaining as an output function the product of two variables. In the analog divider disclosed division is performed by using a reciprocal generator, which consists of two or more diodes and a resistance network, and a function generator plus a Hall effect multiplier.

Patent 3,202,931 Field 9C

COHERENT FREQUENCY CONVERTER FOR TESTING MICROWAVE DEVICES WITH AUDIO SPECTRUM ANALYZER.
Patent assigned to Army,
by Roland F. Koontz, Jr. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Frequency converters, Frequency analyzers), (*Frequency analyzers, Frequency converters), Test equipment(Electronics), Microwave equipment, Spectrum analyzers, Audio frequency, Oscillators, Low frequency, Mixers(Electronic), Patents.

The analyzer is useful in radar systems where it is necessary to keep the energy distribution of energy lines confined to a narrow frequency space with the interline frequency regions kept free of all noise and spurious modulation. The device converts a signal from a low frequency to a high frequency and back to a low frequency.

Patent 3,202,932 Field 9B, 9A

VARIABLE FREQUENCY MULTI-PHASE SIGNAL GENERATOR WITH PHASE DIFFERENCE CONSTANT OVER FREQUENCY BAND.
Patent assigned to Air Force,
by Glenn W. Bones and Walfred R. Raisanen. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Signal generators, Phase(Electronics)), Oscillators, Broadband, Phase shifters, Networks, Clocks, Digital computers, Patents.

The multiphase clock source is for digital computer systems. The clock comprises a variable frequency oscillator, a wideband RC phase shifting network for deriving from the oscillator output equal amplitude signals of the oscillator frequency that maintain a constant amplitude and a constant phase separation of 90 degrees over the desired range of variation of the oscillator frequency. These two signals are then combined into three clock phases of constant amplitude and phase relationship by means of a transformer network.

Patent 3,202,942 Field 9A

MICROWAVE POWER AMPLITUDE LIMITER.
Patent assigned to Army,
by Robert V. Garver and David Y. Tseng. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Limiters, Microwave equipment), Waveguides, Radiofrequency power, Electrical impedance, Diodes(Semiconductor), Germanium, X band, Patents.

The amplitude limiter is for use in FM radio altimeter and FM radar systems. The non-linear forward impedance characteristic of a diode is utilized in a waveguide in order to produce a power limiting operation. A diode is inserted in a waveguide in a passive circuit configuration, that is, no external biasing of any sort is utilized--and the waveguide is terminated at one end by its characteristic impedance so that there is no reflection of the portion of the energy transmitted past the diode. With such an arrangement, a wave having a relatively constant power level is reflected at the diode for waves having a wide range of power levels which are inserted at the open end of the waveguide.

Patent 3,202,946 Field 9E

WAVE GUIDE CONNECTOR.
Patent assigned to Army,
by Donald J. Newman. 24 Aug 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Waveguide couplers, Bolted joints), Patents, Flanges.

A waveguide connector is disclosed which has a choke with threaded apertures. The flange is provided with slots matching the apertures of the choke. In this way bolts threadably held in the choke may be left in place and connection made by sliding the flange into mating contact with the choke and threadably tightening the bolts. One or more slots may be replaced by an aperture to insure a secure connection.

Patent 3,202,968 Field 9C

SIGNAL MONITORING INSTRUMENT.
Patent assigned to Navy,
by Herman R. Eady, Jr., Robert D. Strait and Paul I. Atkinson. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Monitors, Signals), Data processing systems, Control systems, Telemeter systems, Computers, Patents.

The signal monitoring instrument is useful in electronic search, telemetering, control apparatus, data processing systems and computer operations. It converts a plurality of input signals into a single output signal having an amplitude equal to or proportional to the greatest amplitude of any one of the plurality of input signals at any given instant.

Patent 3,202,981 Field 9B

ANALOGUE-TO-BINARY CODE CONVERTER.
Patent assigned to Navy,
by Ditmar H. Bock. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Analog-to-digital converters, Patents), Digital computers, Digital systems.

The code converter is for converting an analogue voltage or other varying signal to a binary code output which is suitable for use by most digital computers. The converter uses no moving parts and may operate up to and beyond 100,000 conversions per second. The system eliminates transient noise and switching chatter.

Patent 3,204,418 Field 9A

MULTIVIBRATOR-TYPE CONTROL CIRCUIT FOR THERMOELECTRIC ELEMENTS.
Patent assigned to Commerce,
by Donald A. Mathews. 7 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Thermoelectricity, Circuits), (*Circuits, Thermoelectricity), Diodes(Semiconductor), Patents, Relaxation oscillators, Resistance(Electrical), Heating, Cooling, Electric currents.

The control circuit supplies a thermoelectricelement with current in the heating and cooling direction in response to the variations in the resistance of a resistance-type sensor associated with the element. The element is arranged to be connected to either a heating or cooling current source by meansof a pair of PNPN four-layer diodes. The PNPN diodes are connected into a multivibrator configuration by coupling elements which include the resistance-type sensor associated with the thermoelectric element.

Patent 3,205,432 Field 9A, 7D

CAVITY RESONATORS.
Patent assigned to Navy,
by Edward L. Cochran. 7 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Cavity resonators, Microwave equipment), Design, Paramagnetic resonance, Microwave spectroscopy, Patents.

The microwave cavity resonator may be used in the field of electron spin resonance spectroscopy for studying samples of paramagnetic materials which are supported within the resonator. The resonator passes a maximum amount of light through the walls to the sample. A.D.C. magnetic field that is modulated at a high frequency can be introduced into the resonator with a minimum of eddy current loss.

Patent 3,205,449 Field 9E

D. C. PUMPED ELECTROSTATICALLY FOCUSED PARAMETRIC AMPLIFIER.
Patent assigned to Army,
by Burton J. Udelson. 7 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Parametric amplifiers, Patents), Electron beams, Electron guns, Electron lenses, Electrostatics, Pumping(Electronics), Direct current, Focusing.

The amplifier includes an electron gun for producing an electron beam, input and output electron beam couplers, a collector, and an electrostatically focused pump region between the couplers. The electrostatic focusing lenses, which produce the natural resonant electron beam frequency necessary for D. C. pumping, are distributed uniformly along the length of the amplifier. Amplification in the pump region is accomplished by coupling between the electrostatic equivalent of a fast "cyclotron" wave and a slow "cyclotron" wave.

Patent 3,205,460 Field 9A

DIELECTRIC GAP MINIATURIZED MICROWAVE FILTER.
Patent assigned to Navy,
by Elwin W. Seeley and John R. Alday. 7 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Waveguide filters, Microwave equipment), Dielectric properties, Materials, Patents.

The microwave waveguide filter is for dielectrically loaded waveguides. A dielectric slab having gaps therein is used to determine the desired filtering characteristics. The dielectrically loaded waveguide rejects frequencies above and below a given spectrum.

Patent 3,206,633 Field 9A, 14B, 14E

INTENSITY CONTROL FOR OSCILLOSCOPE DISPLAY.
Patent assigned to Air Force,
by Billie R. Jones. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Cathode ray tube screens, Oscilloscopes), (*Oscilloscopes, Cathode ray tube screens), Oscillographs, Recording systems, Graphics, Intensity, Control systems, Electromagnetic waves, Voltage, Electric currents, Display systems, Patents.

The apparatus is for displaying waveforms on the screen of a cathode-ray tube. The graphic displays on the screen of the cathode-ray oscilloscope are suitable for both still and continuously moving film cameras. The "Z" axis, or intensity modulation, feature of an oscilloscope, in addition to the horizontal and vertical axes, is utilized to provide a display in which the trace of the signal to be photographed is of greater intensity than the horizontal sweep, thus improving measurement and analysis of transient signals. (Author)

Patent 3,206,747 Field 9B, 17I

SEQUENTIAL DATA CONVERTER.
Patent assigned to Navy,
by James W. Caspers. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Data processing systems, Sequential analysis), Tracking, Relaxation oscillators, Gates-(Circuits), Analog-to-digital converters, Digital-to-analog converters, Optimization, Radar tracking, Simulation, Control, Data, Computers, Patents.

The sequential process data converter is a data collecting process and provides for converting or changing the form of data in a sequential or adaptive manner. The system has application in the radar art. The system includes a statistic computer, an output control generator unit, an accumulator, an OR gate, and upper and lower threshold comparators.

Patent 3,207,923 Field 9B

STORAGE COUNTER.
Patent assigned to Army,
by Melvin Prager. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Pulse generators, Design), Data storage systems, Patents, Circuits, Voltage, Generators, Pulse counters.

The circuit produces a linear output without the addition of an integrator circuit. The circuit linearizes the output of a storage counter by the substitution of a transistor for a diode.

Patent 3,207,928 Field 9E

PULSE WIDTH DISCRIMINATION CIRCUIT.
Patent assigned to Navy,
by Kenneth W. Van Duzer, Jr. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Pulse discriminators, Circuits), Patents.

The circuit produces an output pulse only upon the occurrence of predetermined time spaced input pulses of complementary polarity. The discrimination circuit is completely transistorized and includes a transistorized gate, a blocking oscillator having a tuned RLC network and a coincident circuit which can be called a polarity responsive AND circuit.

Patent 3,207,930 Field 9E

GATE VOLTAGE GENERATOR.
Patent assigned to Army,
by Richard D. Nielsen. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Gates(Circuits), Pulse generators), (*Pulse generators, Gates(Circuits)), Voltage, Wiring diagrams, Timing circuits, Transistors, Capacitors, Avalanche diodes, Switching circuits, Patents.

The gate voltage generator is capable of generating a gate voltage pulse of several seconds duration and may be recycled either during or immediately following the existance of such pulse. Semi-conductor devices may be utilized as the active elements.

Patent 3,207,976 Field 9A

PROGRESSIVE MAGNETIC SATURATION DEVICE.
Patent assigned to Navy,
by Morton Stimler. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D. C., 20231, $0.50

Descriptors: (*Magnetic cores, Magnetic amplifiers), Magnet coils, Patents.

The magnetic core is so configured that it may be selectively saturated progressively along its length in accordance with a magnetic force applied to it. The function generated is determined by the shape of the magnetic core and the input waveform. The device may be employed as a delay line, a function generator and an automatically controlled transformer.

Patent 3,207,993 Field 9A, 17G

FREQUENCY SYNTHESIZER EMPLOYING PLURAL INPUT SOURCES AND PLURAL SWITCHING-MEANS PRODUCING WIDE RANGE OF PUTPUT FREQUENCIES.
Patent assigned to Navy,
by Frank R. Previti and Oscar Shames. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D. C., 20231, $0.50

Descriptors: (*Frequency, Synthesis), (*Radio-frequency oscillators, Frequency shift), Patents, Ultrahigh frequency, Signal generators, Radio-frequency generators, Mixers(Electronic), Simulators, Switching circuits, Electronic switches.

The frequency synthesizer is for simulating frequencies used in a TACAN air-to-air ranging system. The system includes mixers, frequency sources, terminal switches, and switching elements for connecting the various components of the system.

Patent 3,208,005 Field 9A

MULTICHANNEL FREQUENCY SYNTHESIZER.
Patent assigned to Navy,
by Julius Guttman and Jonas M. Shapiro. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Frequency, Synthesis), (*Radio-frequency oscillator, Frequency shift), Patents, Phase detectors, Radiofrequency generators, Mixers(Electronics), Sweep generators, High frequency, Stability, Switching circuits.

The radio frequency oscillator produces a readily and continuously variable output of 16 to 32 megacycles per second. It includes three free-running variable frequency oscillators in a double-conversion type of circuit, each variable frequency oscillator being disciplined through phase detector fed reactances by a one megacycle reference frequency.

Patent 3,208,007 Field 9A

CAPACITIVE NETWORK FOR CRYSTAL COMPENSATION.
Patent assigned to Army,
by Stanley S. Schodowski. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D. C., 20231, $0.50

Descriptors: (*Electrical networks, Variable capacitors), (*Variable capacitors, Electrical networks), Temperature, Crystals, Patents.

The capacitive network gives improved compensation of the frequency variation of a crystal with respect to temperature. A pair of variable capacity diodes are connected in parallel with the diodes oppositely polarized and oppositely biased, with respect to each other, and connecting the parallel diodes in series with a temperature-sensitive bridge that supplies a linear variation in voltage with respect to temperature, across the parallel-connected, variable-capacity diode.

Patent 3,208,014 Field 9E

FERRITE LOADED WAVE-GUIDE ADAPTED FOR PROGRESSIVE MAGNETIC SATURATION.
Patent assigned to Navy,
by Morton Stimler. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Waveguides, Ferromagnetic materials), Magnetic properties, Coaxial cables, Magnetic fields, Conical bodies, Electromagnetic waves, Reflection.

The coaxial line has an inner and an outer conductor. A solid conically shaped ferrite core is disposed within the line and is concentric with it. The base of the core has a diameter equal to the inner diameter of the outer conductor. The inner conductor is connected to a source of unidirectional voltage pulses. Each of the pulses has an increasing potential with respect to time. The ferrite may be progressively magnetically saturated by each of the pulses.

Patent 3,269,069 Field 9E

ANTENNA WITH CONTROLLED VOLTAGE DISTRIBUTION.
Patent assigned to Army,
by Helmut Brueckmann. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Dipole antennas, Voltage), Patents, Antenna feeds, Circuits, Coils.

A dipole-feeding circuit is provided which results in a better defined and predictable amplitude and phase relationship between the voltages and currents of the various elements of a center-fed, vertically-mounted dipole. This is accomplished by maximizing the ratio of the capacity between the top and bottom half of the dipole and ground, and connecting inductors between the bottom half of the dipole and one of the input terminals and between this one terminal and ground.

Patent 3,208,072 Field 9E

MULTIBLADE ANTENNA.
Patent assigned to Air Force,
by Calvin W. Miley. 21 Sep 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Antennas, Space probes), Patents, Broadband, Antenna radiation patterns, Electrical impedance, Antenna configurations.

The antenna is for use on space probe vehicles. The antenna has a characteristic impedance of near 50 ohms over a broad band of frequencies. An antenna is provided wherein the inner and outer curved surfaces are of circular shape and wherein a mere change in size is required when operation at other frequencies is desired.

PB-168 156 Field 9B, 6D
CFSTI Prices: HC$1.00 MF$0.50

Michigan Univ., Ann Arbor. Mental Health Research Inst.
A POSSIBLY MISLEADING CONCLUSION AS TO THE INFERIORITY OF ONE METHOD FOR PATTERN RECOGNITION TO A SECOND METHOD TO WHICH IT IS GUARANTEED TO BE SUPERIOR.
Revised ed.,
by Leonard Uhr. 27 Oct 60, 3p
Unclassified report

Pub. in IRE Transactions on Electronic Computers vEC-10 n1 p96-7 Mar1961.
Revision of manuscript submitted 8 Oct 60.

Descriptors: (*Pattern recognition, Scientific research), (*Character recognition, Scientific research), Computer storage devices, Correlation techniques, Set theory.

Reference is made to the experimentation of 2 groups of workers on pattern recognition. Bledsoe and Browning (Proc. EJCC, p. 225-232, Dec. 1959) first identified input patterns by matching the states into which theythrew randomly chosen 2-tuples with similar lists of states for previously processed patterns. For each state, a 1 was stored, if any example of the pattern in memory had ever thrown that 2-tuple into that state; otherwise, a zero was stored. Bledsoe and Browning reported 78% success with the method over an array of 5 hand-printed alphabets. Highleyman and Kamentsky (IRE Trans. of Electronic Computers, vol. EC-9, p. 263, June 1960) reported only 20% success over 50 alphabets hand printed by 50 different people. Highleyman and Kamentsky are regarded as having demonstrated the limitations of the basic 2-tuple method and means whereby it can be improved. The conclusion is that if the 1-tuple can work so well, then it is to the larger 'n'-tuple methods, that are guaranteed to work even better, that improvements should be made.

PB-168 186 Field 9B
CFSTI Prices: HC$1.00 MF$0.50

Philco Corp., Willow Grove, Pa. Computer Div.
ON THE REDUCTION OF TURNAROUND TIME,
by H. S. Bright and B. F. Cheydleur. 1962, 9p
Unclassified report

Pub. in Fall Joint Computer Conference, Proceedings p161-9 1962.

Descriptors: (*Digital computers, Scheduling), Operation, Time, Reduction, Input-output devices, Computer storage devices.

Turnaround time is defined as the typical time delay between request for, and delivery of digital computer service. The approach is that the operator system be increase in capability for minimizing delays by application of currently available hardware together with planned interruption of long runs by short ones. For small jobs, there would be a break-in or interruption on the large jobs at selected interrupt points. For large jobs, there would be stacking of input and output on disk. Sequencing of jobs would be primarilyby estimated running time, with some consideration for priority and less consideration for chronologyof jobarrival. The belief is that many short jobs would be run with typical delays measured in minutes rather than hours and that none of the jobs, including the longest, would become drastically worse then in conventional first-in, first-out operation.

PB-168 448 Field 9C
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Naval Weapons, Washington, D. C.
UHF ADMITTANCE METER 1602-A, 1602-B AND SUSCEPTANCE STANDARD 1602-P3, 1602-P1 (GENERAL RADIO).
Technical manual instrument calibration procedure, AZ-06.
15 Jun 65, 17p Rept. no. NAVWEPS-17-20AZ-06
Unclassified report

Descriptors: (*Admittance, Test equipment(Electronics)), (*Test equipment(Electronics), Calibration), Variable capacitors, Magnetic properties, Measurement, Instruction manuals, Test methods, Microwave equipment.

The manual describes the calibration procedure for the GR 1602-A or 1602-B UHF admittance meter, the GR 1602-P3 variable air capacitor, and the GR 1602-P1 adjustable stub. The GR 1602-P3 and GR 1602-P1 are susceptance standards supplied with the admittance meter. The GR 1602-A or 1602-B UHF admittance

meter loop balance is tested at 100 Mc. Each loop is, in turn, terminated with a pure resistance equal to the characteristic impedance of the line, and the other two loops are terminated by short-circuits. The dial indicators are adjusted until a balance is indicated by a null on an IF amplifier input level meter. The IF amplifier is used in conjunction with a mixer to provide a heterodyne detector.

PB-168 452 Field 9C
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Naval Weapons, Washington, D. C.
DISTORTION ANALYZERS 330C AND 330D (HEWLETT-PACKARD).
Technical manual instrument calibration procedure, AW-25.
15 Jun 65, 20p Rept. no. NAVWEPS-17-20AW-25
Unclassified report

Descriptors: (*Test equipment(Electronics), Calibration), Distortion, Instruction manuals, Test methods, Harmonic analyzers, Electronic equipment, Noise(Radio).

This procedure describes the calibration of the Hewlett-Packard 330C or 330D distortion analyzers. The unit being calibrated will be referred to herein as the Test Instrument. The Test Instrument consists of an amplifier, a variable frequency rejection filter, an EVM, and a power supply. It measures distortion by rejection of the fundamental signal. The input signal voltage is amplified and measured with the internal EVM to establish a reference level. The fundamental frequency of the signal is then rejected, and that which remains (hum, noise, and harmonic distortion) is indicated by the internal EVM as the percentage of distortion.

PB-168 480 Field 9A, 14D, 13H
CFSTI Prices: HC$2.00 MF$0.50

Union Switch and Signal Div., Westinghouse Air Brake Co., Pittsburgh, Pa.
DRY CIRCUIT TESTS AND TEST EQUIPMENT FOR ACCEPTANCE TESTING OF RELAYS FOR LOW LEVEL APPLICATION.
Interim engineering rept. no. 5, 18 Aug-31 Dec 58, by E. R. Dubas. 1958, 28p
Contract AF33 600 33403
AD 210 035
Unclassified report

See also AD-257 498.

Descriptors: (*Electronic relays, Reliability(Electronics)), Tests, Test equipment(Electronics), Life expectancy, Relays, Airborne, Acceptability, Test methods, Quality control, Circuits.

This report covers a preliminary investigation during which the leading relay users, testers, and manufacturers were solicited for their comments and ideas on the parameters of the 'dry circuit' or low level area. The investigation also included a study of a representative number of miss test equipments, data secured through the use of this equipment, and low level relay applications in military electronic equipment.

PB-168 553 Field 9C
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Naval Weapons, Washington, D. C.
TACHOMETER INDICATOR-GENERATOR TEST SET TTU-27/E.
Technical manual instrument calibration procedure, MA-01.
1 Aug 65, 10p Rept. no. NAVWEPS-17-20MA-01
Unclassified report

Descriptors: (*Tachometers, Calibration), (*Test sets, Tachometers), (*Test equipment(Electronics), Calibration), Generators, Instruction manuals, Test methods.

The manual describes the calibration procedure for the tachometer indicator-generator test set, TTU-27/E, which is designed for testing tachometer generators and indicators.

SC-DC-64-1835 Field 9B, 9C
CFSTI Prices: HC$1.00 MF$0.50

Sandia Lab., Albuquerque, N. Mex.
ADVANCE AND PRIME GENERATOR FOR DRIVING DIGITAL MAGNETIC LOGIC.
by E. J. Bernard, and T. A. Howard. Oct 64, 13p
CONF-650403-2
Contract AT(29-1)-789
Unclassified report

Prepared from International Conference on Non-linear Magnetics, Washington, D. C.

Descriptors: (*Digital computers, Pulse generators), (*Magnetic cores, Pulse generators), (*Pulse generators, Computer logic).

SC-TM-65-115 Field 9C
CFSTI Prices: HC$1.00 MF$0.50

Sandia Lab., Albuquerque, N. Mex.
MOS MONOSTABLE MULTIVIBRATOR ELECTROMETER,
by L. M. Bossart. Apr 65, 12p
Contract AT(29-1)-789
Unclassified report

Descriptors: (*Relaxation oscillators, Electrometers), (*Electrometers, Relaxation oscillators).

UCRL-7463 Field 9B, 20D
CFSTI Prices: HC$3.00 MF$0.75

Lawrence Radiation Lab., Univ. of California, Livermore.
CEL: A TIME DEPENDENT, TWO-SPACE-DIMENSIONAL, COUPLED EULERIAN-LAGRANGE CODE,
by W. F. Noh. Aug 63, 72p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Programming(Computers), Hydrodynamics), (*Hydrodynamics, Programming(Computers)).

## 10. Energy Conversion (Non-propulsive)

AD-465 981 Field 10A
CFSTI Price: HC$2.00

Pennsylvania State Univ., University Park.
Mineral Industries Experiment Station.
BIBLIOGRAPHY OF FUEL CELL CONTRACTS,
by Harry Lerner and L. G. Austin. Jan 65, 29p
Rept. no. 8
Contract DA49 186AMC146D Unclassified report

Descriptors: (*Bibliographies, Fuel cells), (*Fuel cells, Bibliographies).

A list has been prepared of contracts for work on fuel cells sponsored by Federal Agencies of the USA between about 1954 and 1964. Abstracts of the objectives and results of the research are not given since it has not yet been possible to obtain all of the reports of the contracts. It is hoped that the list is almost complete. 220 contracts are included, let by 34 different Agencies, to 97 prime contractors. (Author)

APDA-167 Field 10B, 7B
CFSTI Prices: HC$2.00 MF$0.50

Atomic Power Development Associates, Inc., Detroit, Mich.
LITERATURE REVIEW OF SODIUM-WATER REACTIONS,
by J. A. Ford. 15 Mar 65, 46p Unclassified report
Contract AT(11-1)-1280

Descriptors: (*Steam power plants, Chemical reactions), (*Sodium, Water).

N65-20489 Field 10B, 10A
CFSTI Prices: HC$2.00 MF$0.50

Union Carbide Corp., Parma, Ohio.
STUDY PROGRAM TO IMPROVE FUEL CELL PERFORMANCE BY PULSING TECHNIQUES.
Quarterly rept. period ending 28 Feb 65,
by M. L. Kronenberg. 1965, 29p
Contract NAS3-6460 Unclassified report
NASA CR-54337

Descriptors: (*Fuel cells, Electrochemistry), (*Electrochemistry, Fuel cells).

N65-21389 Field 10B, 22B
CFSTI Prices: HC$1.00 MF$0.50

Lockheed-California Co., Burbank.
STUDY FOR AN ON-BOARD ELECTRICAL POWER SYSTEM FOR A MANNED ORBITAL SPACE STATION.
Condensed summary rept., 6 May-6 Nov 63.
25 Nov 63, 16p LR-17421
Contract NAS9-1307 Unclassified report
NASA CR-62103

Descriptors: (*Space stations, Electric power production), (*Electric power production, Space stations), Manned spacecraft, Solar cells, Nuclear power plants.

N65-22657 Field 10C
CFSTI Prices: HC$2.00 MF$0.50

Yardney Electric Corp., New York.
INVESTIGATION AND IMPROVEMENT OF ZINC ELECTRODES FOR ELECTROCHEMICAL CELLS.
Quarterly rept. no. 2, Oct-Dec 64,
by Z. O. J. Stachurski and G. A. Dalin. 1964, 40p
Contract NAS5-3873
NASA CR-62446
Unclassified report

Descriptors: (*Alkaline cells, Electrodes), (*Zinc, Electrodes).

Patent 3,202,548 Field 10C

RESERVE TYPE ELECTROCHEMICAL BATTERY.
Patent assigned to Army,
by Otto T. Adlhart and Howard R. Knapp. 24 Aug 65
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Low-temperature batteries, Wet cells), (*Storage batteries, Low-temperature batteries), Electrolytes, Ammonia, Anhydrides, Solutions, Potassium compounds, Thiocyanates, Anodes(Electrolytic cell), Cathodes(Electrolytic cell), Electrochemistry, Patents.

The reserve type electrochemical battery can be activated without heating devices in less than one second at temperatures of -70 degrees. The use of a liquid anhydrous ammonia electrolyte assures low temperature operation without auxiliary heat.

Patent 3,202,844 Field 10A, 9A

ENERGY CONVERSION APPARATUS.
Patent assigned to NASA,
by James E. Hatch. 24 Aug 65
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Energy conversion, Crossed field devices), (*Crossed field devices, Energy conversion), Electric power production, Thermoelectricity, Patents.

The apparatus directly converts thermal energy into electrical energy. This is accomplished by heating an electron-emissive plate contained in spaced relationship to an electron collector plate. Electrons which are removed from the electron-emissive plate by heating thereof are accelerated towards an accelerator grid by an electric field established between the plates and grid. A shaped magnet provides a unidirectional nonuniform magnetic field at right angles to the electric field causing the electrons to follow noncolliding circular paths between the electron-emissive plate and electron collector plate.

Patent 3,202,902 Field 10B, 18D

TRANSISTORIZED REGULATED HIGH VOLTAGE SUPPLY.
Patent assigned to AEC,
by Floyd M. Glass. 24 Aug 65,
Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Power supplies, Radiation measurement systems), (*Voltage regulators, Transistors), Patents, Direct current, Oscillators, Batteries + components, Power transformers, Crystal rectifiers, Electric filters.

The transistorized highly regulated high voltage supply is for portable radiation detectors such as a Geiger-Mueller tube or scintillation detector. The system includes a battery, a transistor blocking oscillator, a step-up transformer, a rectifier, and a filter for providing the D.C. output voltage. The regulating action is controlled by a gas tube connected to the output terminal and in effective series relationship with the oscillator input.

Patent 3,206,624 Field 10B, 20I

HYPERSONIC PLASMA THERMOCOUPLE.
Patent assigned to AEC,
by Theodore P. Cotter. 14 Sep 65 Unclassified patent
Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Thermocouples, Plasma medium), (*Power supplies, Thermocouples), Hypersonic flow, Patents, Reentry vehicles, Electrodes, Electric currents, Voltage, Plasma sheath.

The device provides a low voltage, high direct current, electrical power supply for use by a reentry or other hypersonic vehicle. It is attached to the vehicle and consists of an emitter electrode, a collector electrode, an insulation sleeve and an electrical lead for connecting the device to a load.

Patent 3,207,973 Field 10B

D.C. REGULATED POWER SUPPLY EMPLOYING MEANS FOR ADJUSTING THE INPUT IN RESPONSE TO OUTPUT VOLTAGES VARIATIONS.
Patent assigned to Navy,
by Gail D. Smith. 21 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Power supplies, Design), Direct current, Voltage regulators, Patents.

A series element direct current voltage regulated power supply is provided with a linear output voltage control which enables simultaneous control of input and output voltage by the use of a linearly calibrated dial for setting the output voltage. The circuit includes an A.C. source, a rectifier and filter unit, three transistors, three Zener diodes, a reference voltage source, resistors, capacitors and an output potentiometer.

PB-168 145 Field 10A, 10B
CFSTI Prices: HC$1.00 MF$0.50

Oklahoma A and M Coll., Stillwater. School of Electrical Engineering.
ELECTRICAL POWER BY UNCONVENTIONAL METHODS.
Quarterly progress rept. no. 3, 16 Mar-15 Jun 54.
15 Jun 54, 13p
Contract AF33 616 2237
AD 048 018 canceled

Unclassified report

Descriptors: (*Power supplies, Energy conversion), (*Energy conversion, Power supplies), Fuel cells, Thermocouples, Piezoelectric effect, Solar cells, Electrostatic generators, Ion exchange, Experimental data.

Engineering parameters of unconventional sources of electrical energy are being determined from theoretical and experimental data. A survey was made of current technical literature concerning the various individual phenomena involved in the generation of electrical power by unconventional methods, and a brief discussion of each phenomenon is presented.

## 11. Materials

AD-277 455 Field 11I, 11G, 20K
CFSTI Prices: HC$4.00

Battelle Memorial Inst., Columbus, Ohio.
EFFECTS OF ULTRAHIGH PRESSURES ON THE FORMATION AND PROPERTIES OF ORGANIC, SEMIORGANIC, AND INORGANIC MATERIALS.
Technical documentary rept. for 1 Jul 60-31 Dec 61,
by E. J. Bradbury, H. H. Krause, C. B. Sclar, L. C. Carrison, and H. E. Bigony. Jan 62, 112p
Contract AF33 616 7471, Proj. 7340, Task 73404
ASD TDR-62-73

Unclassified report

Descriptors: (*Polymers, Pressure), (*Complex compounds, Pressure), (*Inorganic polymers, Pressure), (*Organic materials, Pressure), (*High-pressure research, Materials), Compressive properties, Silanes, Siloxanes, Phosphines, Boranes, Aluminum compounds, Silicon compounds, Oxides, Tungstates, Polyethylene plastics, Nitriles, Polyamide plastics, Styrene plastics, Acrylic resins, Acrylonitrile polymers, Ethyl cellulose.

Studies on the effect of ultrahigh pressures (up to 90,000 atmospheres on the 'new' post-1960 absolute pressure scale) were carried out on organic polymers and semiorganic and inorganic materials in a Belt-type internally heated high-pressure apparatus. With organic polymers, results indicate that the effect of compression is influenced by compression, compression rate, holding period, and polymer used. Among the semiorganic compounds studied, dimethyldicyanosilane apparently polymerized at 60,000 atmospheres through conversion of the nitrile groups to > C=N-. With inorganic materials above 700 C contamination with alumina and silica from the pyrophyllite gasketing material was found. The contamination studies led to the synthesis of two and possibly four new compounds by reaction of hydrothermally carried alumina and silica with calcium oxide. Ultrahigh pressure-high temperature studies of two heteropolynuclear acids (silico-tungstic and phosphotungstic) and two heteropolynuclear salts (ammonium-arseno-vanado tungstate and ammonium-phospho-vanado tungstate) revealed what appear to be pressure-dependent modifications over a broad pressure-temperature range to 75,000 atmospheres and 1300 C. (Author)

AD-402 385 Field 11I, 11C, 20K
CFSTI Prices: HC$4.00

Battelle Memorial Inst., Columbus, Ohio.
EFFECTS OF ULTRAHIGH PRESSURES ON THE FORMATION AND PROPERTIES OF ORGANIC, SEMIORGANIC, AND INORGANIC MATERIALS.
Technical documentary rept. for Jan-31 Dec 62,
by E. J. Bradbury, H. H. Krause, C. B. Sclar, L. C. Carrison, and G. F. Ward. Dec 62, 106p
Contract AF33 616 7471, Proj. 7340, Task 73404
ASD TDR-62-73 P2

Unclassified report

See also AD-277 455.

Descriptors: (*Polymers, Pressure), (*Complex compounds, Pressure), (*Inorganic compounds, Pressure), (*High-pressure research, Materials), (*Polymerization, High-pressure research), Organic materials, Compressive properties, Copolymerization, Polyethylene plastics, Vinyl plastics, Acrylic resins, Heat-resistant plastics, Silanes, Siloxanes, Aluminum compounds, Iron compounds, Sulfides, Phosphates, Zirconium compounds, Quinones.

It was found that superpressure alone could effect crosslinking of polybutadiene and apparent copolymerization of vinyl monomers to polybutadiene. In a somewhat similar fashion, methylmethacrylate was added to polymethylmethacrylate to give increased-molecular-weight products. Polymerization of quinone

to a relatively heat-stable material was effected by pressurization. Dimethyldicyanosilane was converted to an insoluble polymeric material by pressurizing to 105,000 atmospheres at room temperature. Aluminosiloxanes having either acetylacetone or isopropoxide bonded to the aluminum, and methyl, ethyl, or phenyl groups on the silicon, were polymerized further and probably crosslinked by a combination of pressure and heat. The equilibrium composition of stoichiometric and nonstoichiometric iron monosulfide was shown to be pressure-temperature dependent. A new high-pressure form of aluminum phosphate, probably (A12(PO4)2 . A1(OH)3), was synthesized from hydrated aluminum phosphate and from the quartz form of A1PO4 plus water. At pressures between 50,000 and 110,000 atmospheres, another new high-pressure form of iron phosphate was found. Zirconium pyrophosphate transforms to a new high-pressure polymorph between 45,000 and 105,000 atmospheres which is 15 per cent denser than the ambient pressure form. (Author)

AD-453 088 Field 11G
CFSTI Prices: HC$2.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
PREPACKED CONCRETE.
Technical note,
by William R. Lorman. 12 Nov 64, 34p
Rept. no. TN-N-664
Proj. Y R011 01 01 080
Unclassified report

Descriptors: (*Concrete, Physical properties), Aging(Materials), Mechanical properties, Compressive properties, Density, Weight, Tests, Elasticity, Cements.

This report sets forth the experimental results obtained with test specimens removed from 24 prepacked concrete wallettes. Test observations were made throughout an 8-year period. The results shed light on the comparative physical properties of prepacked concrete made either with coral aggregate or river aggregate. The test data obtained with hardened prepacked concretes show that: (1) bulk density of coral concrete, made with sea-water grout, decreases as moist-curing time is increased; (2) bulk density, Young's modulus, and volume change are unaffected by type of cover atop the wallette form; (3) the physical properties examined are not perceptibly related to the original location of the test specimen within the wallette; (4) Young's modulus of coral concrete varies more than that of reference concrete; and (5) after 8 years of room-dry storage, about 0.1 percent shrinkage is common to any group of prepacked concretes investigated, but the average weight loss of coral concrete is four times as much as that of reference concrete.

BM-RI-6624 Field 11F
CFSTI Prices: HC$1.00 MF$0.50

Bureau of Mines, Boulder City, Nev. Metallurgy Research Lab.
ELECTROREFINING URANIUM IN A CHLORIDE ELECTROLYTE,
by R. E. Campbell and T. A. Sullivan. Sep 64, 17p
Unclassified report

Descriptors: (*Uranium, Refining(Metallurgy)), (*Refining(Metallurgy), Uranium), Chlorides, Electrolytes.

BNL-928 Field 11F
CFSTI Prices: HC$3.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
HIGH-TEMPERATURE LIQUID-METAL TECHNOLOGY REVIEW.
Bimonthly technical prog. rev. volume 3, number 2, Apr 65.
1965, 53p PR-14
Contract AT30 2GEN 16
Unclassified report

Descriptors: (*Liquid metals, High-temperature research), Reviews.

CALT-221-9 Field 11F, 20B
CFSTI Prices: HC$1.00 MF$0.50

Keck (W. M.) Lab. of Engineering Materials. California Inst. of Tech., Pasadena.
CONSTITUTION OF GOLD - GERMANIUM ALLOYS QUENCHED FROM THE MELT,
by T. R. Anantharaman, Huey-Lin Luo, and William Klement, Jr. Apr 65, 15p
Contract AT(04-3)-221
Unclassified report

Descriptors: (*Germanium alloys, Gold alloys), (*Gold alloys, Germanium alloys), Quenching(Cooling), Crystal structure.

COO-1198-197 Field 11F
CFSTI Prices: HC$2.00 MF$0.75

Illinois Univ., Urbana. Dept. of Mining, Metallurgy, and Petroleum Engineering.
PHASE TRANSFORMATIONS IN BETA-CUGA ALLOYS,
by Toshio Saburi. Jul 64, 68p
Contract AT11 1 1198
Unclassified report

Descriptors: (*Copper alloys, Gallium alloys), (*Phase studies, Copper alloys), Transformations.

GA-5273 Field 11F, 18H, 18J
CFSTI Prices: HC$1.00 MF$0.50

General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
EFFECTS OF IRRADIATION ON A-302B STEEL SUBJECTED TO A MULTIAXIAL STRESS-DISTRIBUTION,
by T. A. Trozera and P. W. Flynn. 12 Oct 64, 5p
Rept. nos. GA-5273, CONF-512-15
Contract AT04 3 167
Unclassified report

Descriptors: (*Stainless steel, Radiation damage), (*Radiation damage, Stainless steel), Stresses, Pipes, Reactor materials.

N65-23003 Field 11F
CFSTI Prices: HC$1.00 MF$0.50

New York Univ., N. Y.
EFFECT OF PRESSURE ON METALLURGICAL PHENOMENA.
Progress rept. no. 9, 1 Jul-31 Dec 64.
1964, 12p
Grant NsG-90-60
NASA CR-62542
Unclassified report

Descriptors: (*Alloys, High-pressure research), Lead alloys, Tellurium alloys, Tin alloys, Thallium alloys, Pressure.

N65-25874 Field 11F
CFSTI Prices: HC$1.00 MF$0.50

TRW Equipment Groups, Cleveland, Ohio.



794-373 0 - 65 - 17

DETERMINATION OF ELEVATED-TEMPERATURE FATIGUE DATA ON REFRACTORY ALLOYS IN ULTRA-HIGH VACUUM.
Quarterly rept. no. 3, 1 Jan-1 Apr 65,
by C. R. Honeycutt, T. F. Martin, and J. C. Sawyer.
19 Apr 65, 20p CSC' 11F
Contract NAS3 6010
NASA CR-54389

Unclassified report

Descriptors: (*Refractory metal alloys, Fatigue-(Mechanics)), High-temperature research, Vacuum.

OTR-130 Field 11H

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
HIGH-TEMPERATURE, FIRE-RESISTANT HYDRAULIC FUIDS.
Sep 65, 18p Unclassified report

Prepared in cooperation with F. W. Dodge Co., New York. Available free from the Clearinghouse.

Descriptors: (*Hydraulic fluids, Synthesis(Chemistry)), (*Heat-resistant materials, Hydraulic fluids), Flammability, Compatibility, Paints, Elastomers, Plastics, Ethers, Mineral oils, Siloxanes, Polymers, Organic phosphorus compounds.

Significant reports covering the period since 1963 were selected for the study, with reference to revelant earlier work. Recent Government-sponsored research has been directed towards the development of fire-resistant hydraulic fluids capable of withstanding high temperatures. Present hydraulic fluids are no longer fully satisfactory for use at the high temperatures now found in today's hydraulic systems. The increasing complexity of these hydraulic systems makes leakage inevitable, requiring the fluid to be both fire-resistant and compatible with existing paints, elastomers, and plastics with which it may come in contact. Significant advances have been made in the study of hydraulic fluids capable of meeting these requirements, and several promising types are now undergoing development and testing. The report evaluates the status of presently available high-temperature, fire-resistant hydraulic fluids and describes recent research and development on the most promising new types now being studied. (Author)

Patent 3,198,653 Field 11C, 11F

COATED COLUMBIUM ARTICLE.
Patent assigned to Air Force,
by William B. Hall. 3 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Ceramic coatings, Niobium), (*Niobium, Ceramic coatings), Aluminum compounds, Oxides, Coatings, Flame spraying, Corrosion inhibition, Refractory metals, Jet engines, Patents.

Columbium and columbium alloys are coated to protect against oxidative degradation at the high temperatures generated in the afterburner sections of high speed jet aircraft engines. The columbium metal is flame sprayed with a layer of alumina and a second layer of a fired, slip sprayed metallic oxide is bonded to the first layer. The second layer may be magnesium oxide.

Patent 3,202,473 Field 11E

PROCESS OF CREASEPROOFING CELLULOSIC FABRICS WITH TETRAKIS(N-METHYLOLCARBAMOYLETHYL) ETHYLENEDIAMINE.
Patent assigned to Agriculture,
by Bethlehem K. Andrews and John G. frick, Jr.
24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Textiles, Additives), Amides, Ethylenediamine, Cotton textiles, Cellulosic plastics, Impregnation, Catalysts, Deformation, Inhibition, Patents.

Durable wrinkle resistance finishes are imparted to cellulosic textiles. The textile is impregnated with an aqueous solution containing, by weight, about 10 percent of tetrakis(N-methylolcarbamoylethyl)ethylenediamine and from 0.5 to 3.0 percent of an acid catalyst. Water is removed and the textile is cured, washed, and dried.

Patent 3,202,474 Field 11E

PROCESS FOR CROSSLINKING CELLULOSE WITH FORMALDEHYDE ADDUCTS OF DIVINYL SULFONE.
Patent assigned to Agriculture,
by Clark M. Welch. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Textiles, Additives), (*Cellulose, Textiles), Cotton textiles, Fibers(Natural), Formaldehyde, Organic sulfur compounds, Complex compounds, Catalysts, Patents.

The crosslinked cellulosic fabrics exhibit increased wrinkle resistance and enhanced dimensional stability. The process involves wetting the fabric with a solution in an inert volatile solvent of an alkaline catalyst together with an addition product formed by the base-catalyzed reaction of formaldehyde with divinyl sulfone. The wetted fabric is kept at 20 to 170 degrees C. for from 5 to 30 minutes.

Patent 3,202,476 Field 11F

USE OF NICKEL ARSENIDES AND NICKEL TO PROMOTE PHASE SEPARATION IN LIQUID-LIQUID EXTRACTION.
Patent assigned to AEC,
by Thomas Joseph Collopy, John Herbert Mueller and Wendell Sims Miller. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Solvent extraction, Uranium), (*Uranium, Solvent extraction), Nickel alloys, Arsenic alloys, Nickel, Separation, Surface properties, Liquids, Nitric acid, Solutions, Phosphates, Additives, Ores(Metal sources), Refining(Metallurgy).

A process is disclosed for the separation of the aqueous phase from the organic phase in liquid-liquid extraction, for example, the extraction of uranium from nitric acid solution with tributyl phosphate. The separation is improved by use of a finely divided additive selected from the group consisting of nickel metal and the nickel arsenides.

Patent 3,202,626 Field 11I

MODIFIED POLYTETRAFLUOROETHYLENE DISPERSIONS AND SOLID PRODUCTS.
Patent assigned to Navy,
by Vincent G. FitzSimmons and William A. Zisman.
24 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Halocarbon plastics, Preparation), (*Colloids, Halocarbon plastics), Gels, Fibers, Aluminum compounds, Acetates, Material forming, Sintering, Patents.

The aqueous thixotropic polytetrafluoroethylene dispersions are useful in the production of seals, gaskets, bearing materials and tubing. The dispersions are prepared by adding an aqueous sol of the colloidal boehmite alumina fibrils bearing adsorbed acetate ions with an aqueous dispersion of polytetrafluoroethylene.

Patent 3,202,951 Field 11F, 14B

ALLOYS AND ELECTRICAL TRANSDUCERS.
Patent assigned to AEC,
by Albert Krinsky. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Aluminum alloys, Oxidation), (*Transducers, Heat-resistant metals + alloys), Patents, Iron alloys, Titanium alloys, Resistance-(Electrical), Strain gages, Resistors, Metal films, Ceramic coatings.

The alloy is utilized for the manufacture of strain gauges and resistance elements. The alloy has greatly improved high temperature oxidation resistance. It consists of 25 to 30 atomic percent of iron, 35 to 50 percent aluminum and 20 to 40 percent titanium.

Patent 3,203,898 Field 11H

LUBRICATING COMPOSITIONS CONTAINING CONDENSATION POLYMERS OF CHLOROMETHYL AROMATICS.
Patent assigned to Olin Mathieson Chemical Corp.,
Niagara Falls, N. Y.,
by Edward E. Harris. 31 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Lubricant additives, Halogenated hydrocarbons), (*Halogenated hydrocarbons, Lubricant additives), (*Polymers, Lubricant additives), Silanes, Viscosity, Chlorine compounds, Aromatic compounds, Halocarbon plastics, Polymerization, Patents.

A thickening agent having improved thermal stability for mineral or synthetic lubricating oils, especially silane fluids, is a condensation polymer of 2-chloromethyl-4-isopropyltoluene. The reaction occurs in a cyclohexane or carbon disulfide solvent medium, and requires a ferric, aluminum, or stannous chloride catalyst. The ratio of catalyst to toluene monomer varies from 1:5 to 1:20. From 5 to 40 percent of the isopropyltoluene polymer is added to a tetra-alkyl or mixed alkyl aryl silane base having a molecular weight of 450 or more. The products retain their lubricity at temperatures of 400 to 700 degrees F. over extended periods.

Patent 3,205,034 Field 11E

PROCESS FOR TREATING COTTON TEXTILES WITH N,N'-ETHYLENE BIS(P,P-BIS (AZIRIDINYL)-N-METHYL PHOSPHINIC AMIDE).
Patent assigned to Agriculture,
by Leon H. Chance. 7 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Cotton textiles, Additives), (*Fire-resistant textiles, Preparation), N-heterocyclic compounds, Organic phosphorus compounds, Amides, Impregnation, Polymerization, Deformation, Inhibition, Patents.

The invention involves process for treating cotton textile material and inducing therein dimensional stability, wrinkle resistance, and flame resistance; which process comprises impregnating the cotton textile material with an aqueous solution of N,N'-ethylene bis (P,P-bis(1-aziridinyl)-N-methyl phosphinic amide) and heating the impregnated cotton textile material to polymerize the N,N'-ethylene bis (P,P-bis(1-aziridinyl)-methyl phosphinic amide).

Patent 3,205,170 Field 11H, 7C, 21D

STABILIZATION OF ORGANIC COMPOUNDS.
Patent assigned to Universal Oil Products Co., Des Plaines, Ill.,
by Ernest L. Pollitzer. 7 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Organic compounds, Stabilization), (*Petroleum, Stabilization), (*Lubricant additives, Polymers), (*Polymers, Lubricant additives), Oils, Phosphates, Amines, Polymerization, Polyethylene plastics, Acrylic resins, Copolymerization, Pyridines, Hydrocarbons, Patents.

From 0.0001 to 5 percent by weight of an oil soluble alkyl acid phosphate salt of a copolymer is used as a stabilization agent for lubricating oils. Hydrocarbon oils such as gasoline, kerosene, diesel oil, fuel oil, and marine oil are stabilized against deterioration in storage and transportation by adding a small amount of an oil soluble alkyl acid phosphate salt of a copolymer. The copolymer contains from 0.1 to 3.5 percent of basic amino nitrogen and at least 5 percent of the basic amino nitrogen being neutralized with the phosphate.

Patent 3,206,399 Field 11H

DIESEL LUBRICATING OIL.
Patent assigned to Socony Mobil Oil Co., Inc.,
by Robert H. Davis and Richard G. Ramge. 14 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Lubricants, Preparation), (*Organic nitrogen compounds, Lubricants), Antioxidants, Calcium compounds, Acetates, Phenols, Amino acids, Stabilization, Patents.

The high temperature oxidation resistant properties of oils are improved by the incorporation of a carbonated, sulfurized basic calcium alkyl phenate and a calcium acetate compound stabilized with N-acyl-substituted

sarcosines. A mineral lubricating oil contains from 2 to 8 percent by weight of calcium acetate, from 01. to 2 percent of an N-acyl sarcosine such as lauroyl or stearoyl sarcosine, and from 2 to 8 percent of a calcium alkyl phenate of a propylene tetramer-alkylated phenol. The lubricating composition is suitable for large, low-speed marine diesel engines. The additive also enhances the anti-corrosive and water-resisting properties of the lubricant, and reduces the tendency of the oil to form deposits at the exhaust port.

Patent 3,206,400 Field 11H

MINERAL OIL COMPOSITION.
Patent assigned to Shell Oil Co., New York,
by Dervin L. Flowers. 14 Sep 65
Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50 Unclassified patent

Descriptors: (*Lubricant additives, Antioxidants), (*Antioxidants, Lubricane additives), (*Polymers, Lubricant additives), Sulfides, Acrylic resins, Copolymerization, Fatty acid esters, Phenols, Phosphate, Cleaning compounds, Viscosity, Wear resistance, Corrosion inhibition, Pyridines, Patents.

A vinyl thioether/acrylic acid ester copolymer additive imparts improved anticorrosive and anti-sludging properties to lubricating oils, greases, heating fuels, and hydraulic fluids. Acrylic acid esters having from 3 to 9 carbon atoms in the acrylate radical, such as stearyl or lauryl acrylate or methacrylate, are polymerized with hydroxyethyl vinyl sulfide or similar alkyl or cycloalkyl vinyl sulfides. The mol ratio of ester to thioether ranges from 1:3 to 5:1, and the reaction is conducted in the presence of an azo or peroxide catalyst. Mineral or synthetic oils contain from 0.1 to 10 percent by weight of the copolymer additive, and from 0.1 to 0.5 percent of a phenolic anti-oxidant such as 4,4'-methylene bis(2,6-ditertiarybutyl-phenol). The lubricant also contains a minor amount of a vinylpyridine anti-wear compound.

Patent 3,206,401 Field 11H

LUBRICATING OIL COMPOSITIONS CONTAINING ESTER OF MERCAPTO ACID AND A PHOSPHONATE.
Patent assigned to Esso Research and Engineering Co.
by Rosemary O'Halloran. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Lubricant additives, Organic sulfur compounds), (*Hydraulic fluids, Additives), (*Organic surfur compounds, Lubricant additives), (*Phosphonic acids, Lubricant additives), Esters, Organic phosphorus compounds, Alcohols, Transmission gears, Lubrication, Pressure, Wear resistance, Antioxidants, Acetates, Patents.

An ester-phosphonate additive for industrial gear oils, automotive automatic transmission fluid, and rear axle lubricants improves rubber resisting and oxidation stabilizing characteristics. Esters formed from mercapto acetic or propionic acids and aliphatic alcohols of more than 8 carbon atoms such n-butanol, tallow, lauryl, or stearyl alcohol are combined with dibutoxy butyl, dibutoxy lauryl, or didecyl decane phosphonate. A lubricating oil contains from 0.5 to 10 weight percent of phosphonate and an equal amount of the ester compound, and from 1 to 5 percent polyisobutylene or the copolymer of vinyl acetate and dialkyl fumarate as a viscosity index improver. The lubricant is useful in transaxle systems, where nylon and rubber parts are employed.

Patent 3,206,402 Field 11H

STABILIZATION OF ORGANIC MATERIALS.
Patent assigned to Geigy Chemical Corp., Greenburgh, N. Y.,
by Stuart Walter Critchley, Hale Barns, and
Donald Richard Randell. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Organic compounds, Stabilization), (*Lubricants, Stabilization), (*Lubricant additives, Antioxidants), (*Antioxidants, Lubricant additives), N-heterocyclic compounds, S-heterocyclic compounds, Terpenes, Carboxylic acids, Polyvinyl chloride, Esters, Alcohols, Patents.

8-Chloro-10:11-dihydrodibenso (b,f) (1:4) thiazepine is used as an oxidation stabilizer for lubricating oil compositions. Synthetic oils such as those used as lubricants for turbo-propeller and turbojet engines are stabilized by adding a small amount of a thiazepine compound. From 0.001 to 5 percent by weight of 8-chloro-10:11-dihydrodibenzo(b,f) (1:4) thiazepine is used as a stabilizing agent.

Patent 3,206,403 Field 11H

MINERAL OIL CONCENTRATES CONTAINING NON-ASH-FORMING OIL ADDITIVES.
Patent assigned to Shell Oil Co., New York,
by Bobby W. Malone and Julian G. Ryan. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Lubricant additives, Polymers), (*Polymers, Lubricant additives), Vinyl plastics, Acrylic resins, Copolymerization, Phenols, Aromatic compounds, Organic phosphorus compounds, Cleaning compounds, Combustion products, Inhibition, Mineral oils, Patents.

Mineral lubricating oil concentrates of non-ash-forming additive mixtures impart good stability and detergency when added to aircraft and automotive lubricants. The concentrates are a mixture of from 15 to 60 percent by weight of a copolymer of vinyl pyrrolidone and a C12-18 alkyl methacrylate, from 3 to 20 percent of 4,4'-methylene bis(2,6-dialkylphenol) and the balance being an East Texas mineral lubricating oil raffinate fraction. The raffinate fraction consists of from 10 to 30 percent by weight of mono- and diaromatics and from 70 to 90 percent by weight of saturates.

Patent 3,206,404 Field 11H

LUBRICANTS CONTAINING BENZALAIKYLIMINE COPOLYMERS.
Patent assigned to Standard Oil Co., Chicago, Ill.,
by Ellis K. Fields. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Lubricant additives, Polymers), (*Polymers, Lubricant additives), (*Organic nitrogen compounds, Lubricant additives), Viscosity, Cleaning compounds, Copolymerization, Polyethylene plastics, Acrylic resins, Vinyl plastics, Styrene plastics, Esters, Patents.

Copolymers of benzalalkylimine are used as viscosity index improvers and detergents in lubricating compositions. Lubricating oils employed in automotive and diesel engines are improved by adding from 1 to 10 percent by weight of a copolymer of benzalalkylimine. Lauryl methacrylate is added to the copolymer to form a detergent type addition agent concentrate for lubricating oils.

Patent 3,206,405 Field 11H

SYNTHETIC LUBRICANTS COMPRISING DEHYDRO-CONDENSATION PRODUCTS OF POLYESTERS.
Patent assigned to Socony Mobil Oil Co., Inc.
by Herbert L. Hepplewhite, Edward A. Oberright, and Robert H. Williams. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Lubricants, Polyester plastics), (*Polyester plastics, Lubricants), Carboxylic acids, Alcohols, Condensation reactions, Peroxides, Sebacic acid, Octanoic acids, Esters, Heat-resistant materials, Butanols, Patents.

Polyester lubricating oils are reacted with organic peroxides to form dehydrocondensation products having high temperature viscosities. Synthetic lubricants comprising dehydrocondensation products of polyesters are used for turbo-jet and turbo-prop engines with temperatures up to 550-600 F, and starting temperatures below -30F. The lubricant is formed by intermixing from 5 to 50 weight percent of the peroxide with the ester and heating the mixture for from 1 to 10 hours at a temperature of from 100 to 200C.

Patent 3,207,769 Field 11I, 7C

FATTY ACID AMIDE-DIESTERS.
Patent assigned to Agriculture,
by Frank C. Magne, Robert R. Mod and Evald L. Skau. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Plasticizers, Synthesis(Chemistry)), Fatty acids, Amides, Esters, Vinyl plastics, Cellulose acetates, Cellulosic plastics, Patents.

The diesteramides are plasticizers for vinyl chloride resins and cellulose triacetate and possess utility as softeners for nitrile rubbers. A product is N-bis-(2-acetoxyethyl)oleamide.

PB-168 504 Field 11E
CFSTI Prices: HC$3.00 MF$0.75

Quartermaster Research and Engineering Command, Natick, Mass. Textile, Clothing and Footwear Div.
A SURVEY OF 18-OUNCE BLENDED SERGE FABRICS: MANUFACTURING AND PHYSICAL PROPERTIES,
by Constantin J. Monego. May 59, 80p
Rept. no. Textile ser-106
Unclassified report

Descriptors: (*Textiles, Manufacturing methods), (*Dyes, Textiles), Woolen textiles, Fibers(Synthetic), Mixtures, Physical properties, Processing.

The report describes the manufacturing and physical properties of 20 experimental serge fabrics which will be evaluated as alternate fabrics for the 18-ounce, all-wool serge now used by the Army and Air Force. These experimental fabrics are blends of wool with such synthetic fibers as have shown promise of being good 'wool-supply extenders' as well as wear and appearance improvers. During the manufacture of these fabrics, the modified Bradford worsted system was found to be satisfactory and no greater production difficulty was encountered than is normally met with in processing the all-wool standard fabric. All of the blends met the specification requirements for weight and strength. eEach of the fiber types, however, when blended with wool, will require modification of the specification in terms of ends and picks per inch. Although dyeing all-wool fabrics to match Air Force Shade Blue 84 is possible, dyeing of the blends was only partially successful; therefore greater experience must be gained by the mills in dyeing these fabrics before the specification requirements for shade can be consistently met on a full production basis. Data on the evaluation of these fabrics in the laboratory and by means of accelerated wear and service acceptability tests will be published in later reports. (Author)

TID-21843 Field 11B
CFSTI Prices: HC$3.00 MF$0.75

Southern Research Inst., Birmingham, Ala.
THE TRUE STRESS-STRAIN PROPERTIES OF BRITTLE MATERIALS TO VERY HIGH TEMPERATURES.
Final rept. for 1 Jul 63-31 Jul 64.
30 Oct 64, 95p
Contract AT(40-1)-2694
Unclassified report

Descriptors: (*Refractory materials, High-temperature research), (*Brittleness, Refractory materials), Tensile properties.

USBM-RC-1157 Field 11F
CFSTI Prices: HC$2.00 MF$0.50

Bureau of Mines, Albany, Oreg. Albany Metallurgy Research Center.
PREPARATION AND EVALUATION OF RHENIUM AND RHENIUM-BASE ALLOYS.
Final rept. for 1 Mar 63-30 Jun 64,
by C. E. Armantrout and H. Kato. 1964, 36p
UCRL-13143
Unclassified report

Descriptors: (*Rhenium, Powder metallurgy), (*Rhenium alloys, Sheets), Nickel alloys, Molybdenum alloys, Tungsten alloys.

## 12. Mathematical Sciences

AD-266 224 Field 12A, 5K
CFSTI Price: HC$6.00

Washington Univ., Seattle.
MATRIX ALGEBRA FOR SOCIAL SCIENTISTS.
PART II, SECTION I. SIMPLE MATRIX COMPUTATIONS,
by Paul Horst. Aug 61, 20p
Contract Nonr47708; Grant PHS M743C6
Unclassified report

See also AD-264 525, -266 225, -267 234, -269 320.

Descriptors: (*Matrix algebra, Instruction manuals), Social sciences, Biology, Statistical analysis, Mathematical prediction.

Material on simple matrix computations is given for the following: Addition and subtraction of matrices; vector multiplication; matrix multiplication; and special matrix products.

AD-266 225 Field 12A, 5K
CFSTI Price: HC$5.00

Washington Univ., Seattle.
MATRIX ALGEBRA FOR SOCIAL SCIENTISTS, PART III. THE STRUCTURE OF A MATRIX,
by Paul Horst. Aug 61, 155p
Contract Nonr47708; Grant PHS M743C6
Unclassified report

See also AD-267 234, AD-269 320.

Descriptors: (*Matrix algebra, Instruction manuals), Social sciences, Biology, Combinatorial analysis, Statistical analysis.

The structure of a matrix is discussed under the following headings: Orthogonal matrices, rank of a matrix, finding the rank of a matrix, basic structure of a matrix, finding the basic structure of a matrix.

AD-267 234 Field 12A, 5K
CFSTI Price: HC$5.00

Washington Univ., Seattle.
MATRIX ALGEBRA FOR SOCIAL SCIENTISTS. PART IV. MATRIX SOLUTIONS,
by Paul Horst. Aug 61, 177p
Contract Nonr47708; Grant PHS M743C6
Unclassified report

Descriptors: (*Matrix algebra, Instruction manuals), Social sciences, Biology, Statistical analysis, Combinatorial analysis, Mathematical prediction, Equations.

Matrix solutions are discussed under the following headings: Inverse of a matrix, computations involving inverses, inverse of a supermatrix, general matrix reduction theorem, and solving linear equations.

AD-269 320 Field 12A, 5K
CFSTI Price: HC$5.00

Washington Univ., Seattle.
MATRIX ALGEBRA FOR SOCIAL SCIENTISTS, PART II, SECTION II. SIMPLE MATRIX COMPUTATIONS,
by Paul Horst. Aug 61, 157p
Contract Nonr47708, Grant PHS M743C6
Unclassified report

See also AD-266 224, AD-266 225.

Descriptors: (*Matrix algebra, Instruction manuals), Social sciences, Biology, Statistical analysis, Groups-(Mathematics), Number theory, Probability, Measure theory, Vector analysis.

Material on simple matrix computation is given for the following: Multiplication of supermatrices; simple statistical equations; and computing the correlation matrix.

UCRL-7569-T Field 12A, 9B
CFSTI Prices: HC$1.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
WRITE-UP OF SUBROUTINE ROMBRG, A GENERAL-PURPOSE ROUTINE FOR NUMERICAL INTEGRATION,
by Fred N. Fritsch. Oct 63, 16p
Contract W-7405-eng-48 Unclassified report

Descriptors: (*Programming(Computers), Integration), (*Numerical methods and procedures, Integration), (*Integration, Numerical methods and procedures).

## 13. Mechanical, Industrial, Civil, and Marine Engineering

AD-444 370 Field 13M, 13B
CFSTI Price: HC$3.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
LATERAL-PLATE AND RIGID-PILE TESTS IN BEACH SAND.
Technical rept.,
by H. L. Gill. 10 Aug 64, 58p Rept. no. R-310
Proj. Y F015 15 01 009
Unclassified report

Descriptors: (*Soil mechanics, Foundations-(Structures)), (*Foundations(Structures), Soil mechanics), (*Sand, Soil mechanics), (*Civil engineering, Soil mechanics), Engineering geology, Loading(Mechanics), Compressive properties.

The objective of this task is to develop procedures for the determination of soil moduli including variations with depth, width of loaded area, and magnitude of deflection. The specific objective of this study was to determine the value of soil modulus and its variation with magnitude of deflection, width of loaded area, and depth in a uniform moist granular soil deposit. Also, it was desired to determine if a relationship exists between soil modulus and a soil property which can be easily determined by an in situ soil test. (Author)

N65-22974 Field 13G
CFSTI Prices: HC$2.00 MF$0.50

Bendix Products Aerospace Div. Bendix Corp., South Bend, Ind.
PNEUMATIC NUTATOR ACTUATOR MOTOR.
Third quarterly rept.,
by G. R. Howland. 31 Mar 65, 27p BPAD-864-15664R
Contract NAS3-5214
NASA CR-54382
Unclassified report

Descriptors: (*Engines + motors, Actuators), (*Actuators, Pneumatic devices).

N65-23212 Field 13H
CFSTI Prices: HC$3.00 MF$0.50

ARDE-Portland, Inc., Paramus, N. J.
FABRICATION OF LARGE DIAMETER SPHERES BY THE ARDEFORM PROCESS.
Final rept.,
by J. J. Cioffi. 22 Jan 65, 53p
Contract NAS9-2648
NASA CR-65003
Unclassified report

Descriptors: (*Stretch forming, Cryogenics), (*Spheres, Stretch forming).

OTR-129 Field 13H

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
BRAZING TECHNOLOGY AND APPLICATION.
Sep 65, 20p Unclassified report

Prepared in cooperation with Westinghouse Electric Corp., Baltimore, Md.
Available free from the Clearinghouse.

Descriptors: (*Brazing, Reviews), Beryllium, Niobium, Diffusion bonding, Electron beams, Honeycombcores, Nickel alloys, Chromium alloys, Joining, Refractory metals, Sandwich panels, Silver solders, Steel, Refractory metal alloys, Aluminum alloys, Graphite.

Significant reports covering the period since 1960 were selected for this study, withreference to relevant earlier works. The advancement of brazing technology over the past few years has resulted in a large part from Government-sponsored research programs in connection with (1) the rapidly advancing space effort and (2) the equally dynamic nuclear reactor field. These applications include requirements for the joining of refractory metals which are relatively difficult or impossible to weld because of their high melting temperatures, dissimilarity, metallurgy aspect, and/or size and design configuration. Requirements for joining metalswithout heating them past their recrystallization point and for fabricating complex forms, such as honeycomb structures, have greatly increased the investigations of brazing techniques. (Author)

Patent 3,198,856 Field 13H, 18J

METHOD OF FABRICATING A COMPOSITE NUCLEAR FUEL CORE ELEMENT.
Patent assigned to AEC,
by Joseph P. Hammond and Thomas D. Watts.
3 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor fuel element, Composite materials), (*Composite materials, Manufacturing methods), Reactor cores, Powder metallurgy, Dies, Patents.

The composite core of nuclear fuel material and a filler material is fabricated by charging a die with the first metal powder and shaping the upper surface, placing the second metal powder in the die and simultaneously pressing the metal powders to form a form-retaining composite metal compact.

Patent 3,204,649 Field 13M, 15E

PERSONNEL DOOR FOR AIR SUPPORTED TENTS.
Patent assigned to Army,
by Frank O. Johnson. 7 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Tents, Design), Patents.

The door is for tents of the frameless type which are supported above the ground by low air pressure. The opening in the tent and the door are preferably circular in shape. The door is secured in the closed position in sealing relation to the access opening by the pressure of air which supports the tent.

Patent 3,205,538 Field 13H, 11E

FIBER RETRIEVER.
Patent assigned to Agriculture,
by August L. Miller, Heber W. Weller, Jr. and Roger S. Brown. 14 Sep 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Textiles, Industrial equipment), (*Industrial equipment, Textiles), (*Fibers, Cleaning), Patents, Rotation, Cylindrical bodies, Gas flow.

The apparatus cleans and removes trash from fibers. The structure includes a rotatable fiber-cleaning cylinder and separate elements for feeding fibers to and removing them from the cylinder. Grid bars and the mote knives are eliminated by providing at least one pair of essentially planar partitions extending the full width of and directed outwardly from the cleaning cylinder, thus defining a trash-removal zone or zones.

Patent 3,205,667 Field 13J, 13A

SUBMARINE AIR CONDITIONING MODULE.
Patent assigned to Navy,
by Edsel W. Frantti. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Air conditioning equipment, Submarines), Patents, Heat exchanges, Thermocouples, Thermoelectricity, Fluid flow, Heat transfer.

The apparatus for cooling a submarine involves the use of Peltier thermocouple apparatus. It consists of a unit which is formed of a group of compactly arranged and cooperating thermoelectric heat exchangers. A unit consists of three such heat exchanges which are arranged for the circulation of one fluid through certain of the heat exchangers and the circulation of another fluid simultaneously through certain other of the heat exchangers. The heat exchangers are generally similarly designed in that each is formed with a passageway through which a fluid may be circulated and each is provided with flat faces permitting assembly in face to face relation. Thermoelectric elements forming thermocouples are arranged between adjacent faces of the assembled housings for effecting heat transfer between circulated fluids.

Patent 3,206,015 Field 13D, 19A

EXPLOSIVE SAFETY CONTAINER.
Patent assigned to Navy,
by Martin F. T. Zimmer and Leo K. Asaoka.
14 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Explosive materials, Containers), (*Containers, Explosive materials), Plastics, Halocarbon plastics, Vinyl plastics, Polyethylene plastics, Nitrile rubber, Transportation, Handling, Patents.

The container is in the form of a plastic block with a hole for containing an explosive. The plastic is loaded into a tubular vessel such as glass or polyethylene. The plastic block is made of a plastic material which does not shatter like metal.

Patent 3,206,242 Field 13C

SPLIT-RING HOISTING CLAMP.
Patent assigned to Navy,
by Herbert L. Fensin. 14 Sep 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Clamps, Hoists), (*Hoists, Clamps), Guided missiles, Handling, Cylindrical bodies, Patents.

The split clamp is for hoisting an elongate article such as a missile. The clamp is suspended from a conventional sling. The lower half of the cylindrical clamp is divided into two hinged sections. The missile may be rotated about its longitudinal axis throughout a 360 degree roll.

Patent 3,206,994 Field 13I, 1E

SCREW JACK BRAKE DEVICE.
Patent assigned to Army, FAA,
by Robert J. Angsten. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Jacks(Mechanics), Safety devices), Airports, Passenger vehicles.

The screw jack can be used to raise and lower the movable passenger transition device of the airport mobile lounge illustrated in patent No. 3,083,784. The brake protects the screw from damage caused by overrotation. The brake element is made of a flexible, resilient, rubber-like material which is mounted on the jack shaft. A polyurethane rubber may be used.

Patent 3,207,111 Field 13K, 13J

VALVE OPERATING MEANS.
Patent assigned to Navy,
by James V. Giliberty. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D. C., 20231, $0.50

Descriptors: (*Valves, Ballast tanks), (*Ballast tanks, Valves), Landing craft, Ventilation, Operation, Patents.

The device is for alternately operating valves from closed to open positions, and is particularly useful in alternately operating the air supply valves and air vent valves between closed and open positions for the ballast tanks of military landing ships. The valves are operated by an electric motor.

Patent 3,207,126 Field 13I, 9A

MASK CHANGER MEANS FOR VACUUM DEPOSITION DEVICE.
Patent assigned to Navy,
by Ernest Byron. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Vapor plating, Industrial equipment), (*Positioning devices(Machinery), Vacuum apparatus), Patents, Vapor plating, Films, Circuits.

The apparatus is for vacuum depositing thin film circuits. A circuit requiring several depositions may be fabricated quickly and with great accuracy within a vacuum chamber without breaking the chamber vacuum. The mask changer may be set up for hand operation or it may be motorized so as to perform all of its operations automatically.

Patent 3,207,168 Field 13G

FLUID VORTEX TRANSFER.
Patent assigned to Army,
by Raymond W. Warren. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Fluid flow, Control systems), Transport properties, Nozzles, Oscillation, Computer logic, Patents, Ducts.

The pure fluid system is useful in such functions as amplification, oscillation and computer logic. The vortex transfer device is used in a pure fluid system for transferring fluid perpendicularly from a duct at one level to a duct at another level within the system with low energy loss and impedance matching.

Patent 3,207,469 Field 13K

HIGH VACUUM VALVE.
Patent assigned to Navy,
by James M. Frame. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D. C., 20231, $0.50

Descriptors: (*High-vacuum valves, Metal seals), Vacuum seals, Cylindrical bodies, Hydraulic fluids, Gases, Pressure vessels, Patents.

The metal-to-metal seal vacuum valve is provided with a bellows which aids in preventing leakage through the housing cover and about the stem. The inner surface of the valve housing is provided with a metal valve seat having a relatively sharp edge around the inner surface. The valve or sealing element is formed of a closed cylindrical chamber having conical ends which are concaved toward each other and designed to permit the chamber to expand radially outwardly under a fluid pressure. Fluid (hydraulic or pneumatic) under pressure is admitted into the cylindrical chamber through the valve stem.

Patent 3,207,533 Field 13E

DOUBLE BAYONET INSULATED TRANSFER LINE COUPLING.
Patent assigned to Air Force,
by Donald A. Van Gundy, Robert J. Richards, Willis G. Steward, and Robert B. Jacobs. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Pipes, Couplings), (*Couplings, Thermal insulation), Patents, Liquids, Disconnect fittings, Temperature, Liquified gases, Pipe fittings.

The coupling is for use in transfer lines conveying fluids at extreme temperatures, for example, liquified gases from a cryogenic source. The transfer lines or tubes to be connected have a double wall configuration. The transfer line junction is formed by sliding the two fluid transfer line sections to adjacent positions midway within an elongated and thermally insulated sleeve. Solid end rings are used to cap the configuration.

Patent 3,207,680 Field 13H

METHOD OF ELECTRODEPOSITING IRIDIUM.
Patent assigned to Army,
by Elizabeth L. MacNamara. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D. C., 20231, $0.50

Descriptors: (*Electrodeposition, Iridium), (*Iridium, Electrodeposition), Patents, Copper, Nickel, Niobium, Molybdenum.

The method may be used for making electrical contacts. The iridium may be plated onto copper, nickel, niobium and molybdenum. The iridium is deposited on the base metal from an electrolytic bath.

PB-168 071 Field 13G, 20D

National Bureau of Standards, Washington, D. C.
HYDRAULIC RESEARCH IN THE UNITED STATES 1964,
ed. by Helen K. Middleton. 14 Aug 64, 225p
Miscellaneous Publication no. 261
Unclassified report

Available from Superintendent of Documents, GPO,
Washington, D. C., 20402, $1.25 as C13.10:261.

Descriptors: (*Hydraulic systems, Scientific research), United States, Bibliographies, United States government, Indexes, Hydrology, Fluid dynamics.

The information contained in the publication was compiled from reports by the various hydraulic and hydrologic laboratories in the United States and Canada.

PB-168 423 Field 13H, 11F
CFSTI Prices: HC$1.00 MF$0.50

Naval Ordnance Test Station, China Lake, Calif.
A TECHNIQUE FOR SAND CASTING TITANIUM AND TITANIUM ALLOYS,
by J. B. LaBosky and D. Veronda. 10 Jul 53, 22p
Technical memo. no. TM-770
Unclassified report

Descriptors: (*Casting, Titanium), (*Titanium, Casting), Titanium alloys, Sand, Zirconium compounds, Tensile properties, Machining, Furnances, Hardness, Heat treatment, Mechanical properties, Molding materials.

A technique for sand casting titanium, utilizing an arc melting furnace based on the 'skull' principle is described. Zirconite sand was found to hold promise as a mold material for casting titanium and its alloys. Castings weighing up to four pounds with a one-inch section have been produced. Tensile strengths of 95,800 psi from machined specimens are reported. A stress-relieving anneal was found to improve the machining characteristics of the castings. Machining was performed without difficulty on castings having a carbon content of 0.87 percent and having a hardness of 45 Rockwell 'C'. (Author)

PB-168 447 Field 13H
CFSTI Prices: HC$4.00 MF$0.75

General Dynamics Corp., Groton, Conn. Electric Boat Div.
INVESTIGATION OF WELDABILITY OF HOT-WORK TOOL STEELS AND A TITANIUM ALLOY.
Final rept. for 1 May 61-Oct 62.
Mar 63, 103p
Contract AF33 616 8044, Proj. 7351, Task 735102
ASD TDR-62-993
Unclassified report

Descriptors: (*Tool steel, Welding), (*Titanium alloys, Welding), Heat treatment, Melting, Vacuum apparatus, Microstructure, Ductility, Hot working, Ultrasonic radiation, Welds, Toughness.

The weldability of H-11 and D6-AC steels and the B-120VCA titanium alloy was investigated. Vacuum-melted and air-melted H-11 steels were compared for both base metal and weldments. The vacuum-melted base metal and weld metal showed higher notch strength and toughness than the air-melted steel. The vacuum-melted H-11 and D6-AC steels were fully heat treated before welding and given various post-weld treatments. An overtempered region was found in the heat-affected zone adjacent to the unaffected base metal. This region acted as a weld crack stopper in the bend test and decreased the transverse strength and ductility. Welding the H-11 steel after full heat treatment resulted in lower notch strength than when fully heat treated after welding. The B-120VCA titanium alloy showed good ductility in the as-welded condition. Age and overage treatments resulted in lower ductility and notch strength than the base metal. Some improvement was obtained by an overage treatment.

PB-168 486 Field 13J, 14A, 5C
CFSTI Prices: HC$3.00 MF$0.75

Booz-Allen Applied Research, Inc., Bethesda, Md.
THE SURFACE EFFECT SHIP IN THE AMERICAN MERCHANT MARINE. PART V. AN ANALYSIS OF THE ECONOMIC POTENTIAL OF THE CAPTURED AIR BUBBLE SURFACE EFFECT SHIP IN THE FUTURE TRANSOCEANIC COMPETITIVE ENVIRONMENT COMPARED WITH CARGO AIRCRAFT AND DISPLACEMENT SHIPS.
Final rept. pt. 5 for May-Jul 65.
Jul 65, 96p
Contract MA3742
Unclassified report

Continuation of Contract MA3232.
See also PB-167 990.

Descriptors: (*Economics, Merchant vessels), (*Merchant vessels, Ground effect machines), (*Ground effect machines, Merchant vessels), Marine surface propulsion, Nuclear powered vessels, Performance-(Engineering), Feasibility studies, Costs, Transportation, Ship structural components, Airfoils, Ducted fans, Power, Ship auxiliary equipment, Airborne.

This report contains the results of an investigation of the economic potential of an advanced marine system. The system under consideration is the Captured Air Bubble (CAB) surface effect ship, and the research effort was directed toward an exploration of the probable economic environment in which the CAB will have to compete in the next ten to twelve years.

PB-168 508 Field 13J, 20K
CFSTI Prices: HC$1.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
FORCED VIBRATIONS OF BEAMS AND THE EFFECT OF SPRUNG MASSES.
Research and Development rept.,
by E. H. Kennard. Jul 55, 16p Rept. no. 955
Proj. NS712 100
AD 75 848 Unclassified report

Descriptors: (*Beams(Structural), Vibration), (*Vibration, Marine engineering), Ship structural components, Damping, Mathematical analysis.

Certain aspects of beam vibrations are discussed which throw light upon particular features of ship vibrations. The topics are: antiresonances and effects of damping in forced vibrations, explicit formulas being given for uniform beams; internal versus external damping; effect of sprung masses on the natural frequencies; and forcing via a sprung mass. (Author)

PB-168 509 Field 13J
CFSTI Prices: HC$1.00 MF$0.50

David Taylor Model Basin, Washington, D. C.
VIBRATION-GENERATOR SURVEY OF THE USS NIAGARA (APA87),
by Norman H. Jasper. Dec 48, 19p
Rept. no. DTMB-699
Proj. NS711 001 Unclassified report
AD 103 103

Descriptors: (*Ship hulls, Vibration), Marine engineering, Tests, Vibrators(Mechanical), Graphics, Resonance, Damping.

The natural modes of vibration of the hull of the USS NIAGARA (APA87) were determined by using a vibration generator. Five modes of vertical vibration, three modes of athwartship vibration, and one mode of torsional vibration were defined. The experimental natural frequencies of vibration are compared with the natural frequencies calculated on the basis of theoretical considerations. Values of the damping constant are calculated on the basis of the experimental data. It is found that the ratios of the frequencies of the first three modes of vertical and transverse vibration to the frequency of the fundamental mode are approximately as the numbers 1, 2, and 3. (Author)

UCRL-7841 Field 13H
CFSTI Prices: HC$1.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
HYDROSTATIC COMPACTING,
by Frank H. Miars. 23 Apr 64, 13p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Hydroforming(Mechanical), Hydrostatic pressure).

UCRL-7860 Field 13J, 11C
CFSTI Prices: HC$1.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
FIRE-RETARDANT COATINGS,
by James R. Gaskill. 19 May 64, 22p
Contract W7405eng48
Unclassified report

Descriptors: (*Fire-resistant coatings, Paints), (*Paints, Fire-resistant coatings).

## 14. Methods and Equipment

Patent 3,201,991 Field 14B, 6S, 22B

PRECISION TEMPERATURE MEASUREMENT AND DISPLAY SYSTEM.
Patent assigned to Navy,
by Hyman P. Mansberg. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Body temperature, Measurement), (*Thermometers, Display systems), (*Display systems, Body temperature), Patents, Thermistors, Temperature sensitive elements, Space medicine, Astronauts, Pressure suits.

The system is used in the design and construction of pressure suits which are used in space travel. Temperature sensing elements or probes are attached to various parts of the body of a person during testing. The temperature sensitive points are successively recorded by an automatic stepping mechanism. The points are measured, weighted and averaged to provide a mean overall temperature reading.

Patent 3,202,042 Field 14E, 20F

SYSTEM FOR MEASURING SEPARATELY BACKGROUND AND AVERAGE LINE LUMINANCE OF DENSITY.
Patent assigned to Commerce,
by Ballard Jamieson and Robert Kee. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Illumination, Measurement), (*Optical scanning, Illumination), Background, Optical images, Measurement, Patents, Printing, Photographic recording systems, Photometers.

The instrument may be used in determining the proper exposure of originals. The illumination on originals being copied is varied until the average luminance of line has a predetermined value and the value of background luminance is within a desired range. The film is then exposed and the resulting negatives achieve a pre-established average line density and an acceptable background density in spite of wide density variations in the originals. An original having insufficient contrast to provide correct line and background densities at any exposure is readily detected and can be rejected in advance.

Patent 3,202,484 Field 14B

SELF-DEMOUNTABLE SUPPORT.
Patent assigned to Agriculture,
by Elmer A. Weaver and Robert L. Pollack.
24 Aug 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Laboratory equipment, Supports), (*Supports, Laboratory equipment), Disconnect fittings, Containers, Seals(Stoppers), Platinum alloys, Rhodium alloys, Rotation, Patents.

The device is for introducing a sample into an open flask for oxygen-filled, closed-flask combustion analysis. It can be used in phosphorus analyses. The support is attached by anchoring it in a hole in the bottom of a glass stopper for a flask. The support is made of very fine wire formed into a specific configuration and having a sample holder attached to the end away from the stopper.

Patent 3,202,485 Field 14B

SUBLIMATION APPARATUS.
Patent assigned to Air Force,
by Alton F. Armington and Joseph R. Weiner.
24 Aug 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Sublimation, Instrumentation), Patents, Design, Pipes, Containers.

The multiple sublimation apparatus is suitable for small batch laboratory use. It includes a pair of identical tubes arranged to be inserted partially within one another, and a plug which closes one end of the assembled tube. This apparatus may be enclosed within other apparatus to which a vacuum line is connected.

Patent 3,202,915 Field 14B, 21C, 20G

PARTICLE BEAM MEASUREMENT APPARATUS USING BEAM KINETIC ENERGY TO CHANGE THE HEAT SENSITIVE RESISTANCE OF THE DETECTION PROBE.
Patent assigned to NASA,
by Lionel V. Baldwin and Virgil A. Sandborn. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Particle beams, Measurement), Kinetic theory, Ion engines, Patents, Probes(Electromagnetic), Ion beams.

The apparatus is for point or local particle beam power density detection and measurement. One source of high-energy particle beams is the ion rocket engine. The particle beam is surveyed with a probe consisting of a detecting wire positioned on electrically and thermally conductive rods and having provision for maintenance of the detecting wire extremities at a substantially constant temperature.

Patent 3,206,072 Field 14B, 6L

PIPETTING MACHINE.
Patent assigned to HEW,
by Calvin R. Mencken. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Laboratory equipment, Physiology), (*Pumps, Laboratory equipment), Patents, Liquids, Automatic.

The pipetting machine is for use in a laboratory of physiology for the handling of serums. The apparatus includes a syringe and a valve portion constituting a variable stroke positive displacement pump and components for selecting a predetermined stroke therefor corresponding to a predetermined amount of material to be pumped, and for operating the pump for delivering the quantity of material corresponding to the selected stroke.

Patent 3,207,898 Field 14E, 17H

OPTICAL PROJECTOR FOR USE WITH A PHOSPHORESCENT SCREEN.
Patent assigned to Navy,
by Clarence R. Linsley. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Photographic projectors, Fluorescent screens), Viewing screens, Tracking, Optical images, Phosphorescence, Patents.

The projector is for use with a phosphorescent screen capable of selectively representing an object by both a persistent and a non-persistent image. It employs a single projector lens and a single lamp unit to project more than one image.

Patent 3,208,008 Field 14B

RANDOM WIDTH AND SPACED PULSED GENERATOR.
Patent assigned to Navy,
by Richard A. Hills. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Pulse generators, Design), Patents.

A random width and spaced pulse generator is provided in which the width of the output pulse is variable in discreet increments. The system includes a variable frequency clock pulse generator, a random pulse generator, three differentiators, three AND gates, two bistable multivibrators, a monostable multivibrator, and a counter.

PB-168 488 Field 14B
CFSTI Prices: HC$1.25 MF$0.50

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Sep 65, 47p
Unclassified report

Descriptors: (*Naval research, Reports), (*Surface properties, Fluorescence), (*Ionopshere, Solar radiation), Atmosphere, Data processing systems, Chemistry, Mechanics, Metallurgy, Radiation monitors, Optics, Electromagnetism, Acoustics.

Complete papers: Surface chemistry of Fluorochemicals; Ionospheric composition and density from 90 to 1200 kilometers at solar minimum. Summaries are given of research of the following fields: applications research, chemistry, mechanics, metallurgy, nucleonics, optics, radio, and sound.

PB-168 501 Field 14C
CFSTI Prices: HC$1.00 MF$0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
DOVAP DATA REDUCTION FROM MAGNETIC TAPE,
by R. E. A. Putnam. Mar 54, 20p
Memorandum rept. no. MR-769
Projs. DA503 06 011, TB3 0538
AD 32 463
Unclassified report

Descriptors: (*Dopplar radar, Data processing systems), (*Magnetic recording systems, Dopplar systems), Magnetic tape, Scanning.

Commercial multichannel magnetic tape-recorders are available which are suitable for Dovap recording. These recorders offer the following advantages over photographic film recording: reduced operating cost, ease of maintenance,

elimination of record-processing delays, and ability to instrument longer missile-flight trajectories than heretofore. The most applicable standard equipments will provide 7 channels of information on a 0.5-in.-wide tape. A study was initiated to determine whether tape records could be read as satisfactorily as present 35-mm film records. Electronic readers employing direct cycle counting appeared technically feasible. Existing Dovap stroboscopic film readers may be adapted to tape readers with only minor modifications, provided a tape scanner is furnished to permit recovery of the signals with the tape at rest. Dovap signals must be recorded on tape in the form of a modulated carrier. Specific scanner requirements and characteristics are outlined, and prospective scanner types are described. (Author)

SWRI-1243-14(a) Field 14B, 18J
CFSTI Prices: HC$3.00 MF$0.75

Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF NONDESTRUCTIVE TESTING INSTRUMENTATION FOR REACTOR PRESSURE VESSELS.
Appendices to quarterly rept. no. 6, 1 Apr-10 Jul 64,
by John R. Barton and Robert D. Wylie. 2 Feb 65, 88p
EURAEC-1345
Contract AT(11-1)-1243

Unclassified report

Descriptors: (*Non-destructive testing, Pressure vessels), (*Reactor system components, Non-destructive testing), Test methods.

## 15. Military Sciences

Patent 3,206,776 Field 15E

INSULATED AIR MATTRESS.
Patent assigned to Army,
by Terris Moore. 21 Sept 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Mattresses, Inflatable structures), Thermal insulation, Patents.

The mattress is designed for field use and is inflated for use. The mattress is insulated by sheets of lightweight, highly compressible, resilient insulating material at the parts of the mattress which are contacted by the feet, hips and shoulders of the one using the mattress.

## 16. Missile Technology

AD-465 574 Field 16B
CFSTI Price: HC$1.00

Ballistic Research Labs., Aberdeen Proving Ground, Md.
TRAJECTORY DETERMINATION WITH LIMITED DATA FROM A SINGLE OBSERVING SITE,
by R. B. Patton, Jr. Sep 62, 17p
Technical note no. TN-1474

Unclassified report

Descriptors: (*Guided missile trajectories, Determination), Exterior ballistics, Position finding, Velocity, Errors, Ranges(Distance).

In certain field operations, it becomes essential to rapidly compute approximate trajectory data with limited input information. Computing methods are outlined for the determination of missile trajectories assuming parabolic motion in a plane. Condition equations are derived from four observations of the trajectory while the missile is in free flight above the effective atmosphere. (Author)

Patent 3,204,525 Field 16A, 13J

MISSILE DEVICE AND ATTACHMENTS THEREFOR.
Patent assigned to Navy,
by Eugene D. Legg and Herman W. Kupetzky.
7 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Guided missiles, Handling), Booster motors, Naval equipment, Guided missile components, Patents, Shipborne

Apparatus is disclosed for use in transporting or handling of missile structures on shipboard. The missile structure includes a booster and the missile structure carrying the warhead and guidance system. The missile complement structure is equipped with circumferentially and longitudinally spaced connectors which coact with securing elements which permit handling of the missiles.

Patent 3,204,526 Field 16A

MISSILE BOOSTER DEVICE AND ATTACHMENTS THEREFOR.
Patent assigned to Navy,
by Eugene D. Legg and Herman W. Kupetzky.
7 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Guided missile launchers, Naval equipment), Guided missile components, Booster motors, Handling, Patents.

The system is designed for missiles having boosters. The missiles are launched from shipboard. The booster complement is equipped with connectors which extend from its periphery and are adapted to coact with securing elements which permit the complement to be transported.

Patent 3,205,778 Field 16A

MISSILE RESTRAINING MEANS.
Patent assigned to Navy,
by Myron J. Bauer and Anthony J. Hogen.
14 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Guided missile launchers, Safety devices), Guided missile safety, Storage, Patents.

The missile launching system has an arrangement for the storage of missiles and the prevention of vertical movement of the missiles which might be caused by inadvertent ignition. The magazine includes a ready service ring having a plurality of storage cells arranged in inner and outer concentric circular rings, having mechanical retaining members located above the forward shoes of the missiles and preventing vertical movement of the

missiles while permitting rotative movement. The retaining members are interrupted and form a pathway at the hoist station permitting vertical movement of a selected missile.

Patent 3,205,820 Field 16D

DRAG-COMPENSATED MISSILE.
Patent assigned to Army,
by William C. McCorkle, Jr., and Robert C. Conard.
14 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Guided missiles, Stabilization systems), (*Fins, Stabilization systems), Drag, Guidance, Accelerometers, Booster motors, Control systems, Patents.

A fin-stabilized missile is disclosed in which the guidance and control system comprises a velocity-measuring, integrating accelerometer which provides a signal for cutoff of the booster motor and for ignition of the sustainer motor, and which further supplies signals indicating the force and direction of drag, and in which the control system utilizes the last-named signals for control of the missile to compensate for its accuracy-disturbing drag.

PB-168 502 Field 16B, 17I
CFSTI Prices: HC$2.00 MF$0.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN ANALYSIS OF SPIN ERRORS IN THE DOVAP SYSTEM FROM THE RECORD OF BUMPER ROUND NO. 5,
by R. B. Patton, Jr. Feb 50, 32p
Memorandum rept. no. MR-504
Proj. TB3 0838E
ATI 74856

Unclassified report

Descriptors: (*Doppler systems, Tracking), (*Tracking, Errors), (*Guided missiles(Surface-to-surface), Spin), Position finding, Guided missile trajectories.

Bumper Missile Round No. 5 was launched at White Sands, New Mexico on 24 February 1949. A discussion is presented of the determination and elimination of errors which entered the DOVAP record of this round as a result of missile rotation. The corrected data has been reduced, and the results are presented in tabular form. (Author)

PB-168 503 Field 16B
CFSTI Prices: HC$3.00 MF$0.75

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE DETERMINATION OF RANGE AND DIRECTION WITH A FIVE-STATION SYSTEM FOR ELECTRONIC MISSILE ACQUISITION,
by John P. Vinti. Nov 55, 97p
Rept. no. BRL-967
Projs. 5B0306011, TB3 0538
AD 86369

Unclassified report

Descriptors: (*Guided missile tracking systems, Telemetering data), (*Ranges(Distance), Guided missile tracking systems), (*Direction finding, Guided missile tracking systems), Guided missile ranges, Analysis

A system known by the name Electronic Missile Acquisition (E.M.A.) is briefly described in Section I. It is there shown that it may lead to undesirably large reduction errors in the direction of the missile, for ranges less than 35 kilometers. A modified E.M.A. system is then proposed, using five stations instead of four and involving the measurement of four phase differences instead of two. This modification removes all reduction error and permits the determination of range as well as direction. An error analysisis carried out with the assumptions of a wave length of one meter, a base line of one kilometer, and a maximum experimental error of one degree in any of the phase measurements. It shows that the modified system is expected to give very good results for the direction at all ranges, provided the angle of elevation is not less than about 2 degrees. It also shows that good results are expected for the range and the rectangular coordinates, for ranges less than about 30 kilometers. (Author)

## 17. Navigation, Communications, Detection, and Countermeasures

AD-456 962 Field 17I, 9D
CFSTI Price: HC$4.00

Navy Electronics Lab., San Diego, Calif.
AUTOMATIC DISTRIBUTION-FREE STATISTICAL SIGNAL DETECTION; A REVIEW AND EVALUATION OF AVAILABLE TECHNIQUES.
Research rept. for Aug 61-Jun 64,
by C. B. Bell. 16 Oct 64, 147p
NEL-1245
Proj. SF001 0205, Task 6072

Unclassified report

Descriptors: (*Signals, Detection), (*Detection, Statistical analysis), (*Detectors, Design), Noise(Radar), Radar tracking, Radar signals, Sonar equipment, Radar jamming, Data processing systems, Mathematical models, Theorems, Communication theory, Reviews.

Distribution-free statistical techniques are reviewed and evaluated for possible application to the signal detection problem. These techniques are classified into three types: (1) The noise distribution is known but the signal-plus-noise is not, (2) neither distribution is known but a pure-noise sample is available, and (3) the distributions and a pure-noise sample are all unavailable. Several of the distribution-free detectors are almost as efficient as their parametric counterparts and several are uniformly better than the parametric detectors for certain classes of Gaussian noise. (Author)

Patent 3,201,998 Field 17G

SPACE SENSING DEVICE.
Patent assigned to Army,
by Leon Horn. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Compasses, Magnetostrictive elements), (*Magnetostrictive elements, Compasses), Direction finding, Earth, Rotation, Patents.

The magnetostrictive space sensing element or non-magnetic compass gives direction, magnitude and duration of an applied force. It provides a reading of true north without the necessity of knowing the location of the compass on the earth. This means that no correction is required for latitude nor longitude any place on earth. A reading of a simple dial is sufficient to determine direction.

Patent 3,202,052 Field 17B, 17H

INTERFEROMETER USED WITH PIEZOELECTRIC CRYSTAL TO FORM LIGHT VALVE.
Patent assigned to Air Force,
by Werner R. Rambauske and Hermann R. Mestwerdt.
24 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Interferometers, Light communication systems), (*Light communication systems, Interferometers), Piezoelectric crystals, Light, Valves, Patents.

An optical valve is disclosed wherein the control of radiation flux from a high intensity light source is facilitated. The valve consists of an interferometer controllable by an outside electrical signal (which may represent a demodulated radar signal, for example) and combined in unique manner with a grid or diaphragm element matching the fringe pattern produced by the interferometer, the fringe pattern shifting in accordance with the electrical signal received to effect the closed or open positions of the grid or diaphragm element.

Patent 3,202,736 Field 17A, 13H

PROCESS FOR REINFORCING OPEN HEMISPHERICAL TRANSDUCERS.
Patent assigned to Navy,
by John J. Horan, James R. Brown, Jr., and
Maurice F. Pressler. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Piezoelectric transducers, Hemispherical shells), Reinforcing materials, Underwater sound equipment, Sonar equipment, Casting, Ceramic materials, Moistureproofing, Coatings, Heat treatment.

The piezoelectric acoustic transducer is for use in underwater sonar. The edge strength of the open hemispherical ceramic element is increased by slip-casting the element in the form of a hollow hemisphere, drying it, dipping the rim in a fresh slip solution, drying it and firing it after the termination of the drying operation.

Patent 3,202,909 Field 17F

VARIABLE FREQUENCY OSCILLATOR TYPE OF METAL DETECTOR SENSITIVE TO MUTUAL RESISTANCE CHANGES.
Patent assigned to Army,
by Chandler Stewart. 24 Aug 65

Unclassified patent

Available from Commissionerof Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Mine detectors, Land mines), (*Detectors, Metals), Patents, Oscillators, Feedback, Circuits, Phase shift, Auditory signals.

A metal detector is disclosed which eliminatesthe production of an output signal that is a function of the soil in which the metal is to be detected. The detector has a feedback network to achieve maximum bandwidth of audio frequencies. These audio frequencies are obtained from the VFO without the use of a beat frequency oscillator.

Patent 3,205,475 Field 17A, 19H

TORPEDO TRACKING SYSTEM.
Patent assigned to Navy,
by Rene N. Foss. 7 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Tracking, Torpedoes), (*Torpedoes, Tracking), Hydrophones, Underwater sound equipment, Patents.

The torpedo tracking system includes a torpedo carrying signal-generating and transmitting apparatus, a remotely-located hydrophone array and associated shore-station-based apparatus, and a pre-launch synchronization-site having apparatus providing a communication link between the torpedo and the shore station apparatus for pre-launch synchronization operations.

Patent 3,206,719 Field 17G, 20A

COMPASS DIRECTION INDICATING SYSTEM.
Patent assigned to Navy,
by Samuel Pure. 14 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Compasses, Hydrophones), Direction finding, Acoustic equipment, Diodes(Semiconductor), Friction, Relaxation oscillators, Patents.

The system is for transmitting information concerning the orientation of a hydrophone with respect to some fixed point such as magnetic north. The hydrophone is associated with a liquid-filled container housing a rotary assembly consisting of a shaft, ring-like permanent magnet and a disc element which has a transparent window which varies linearly in area as it extends about the disc. A light source between the magnet and disc and a light-sensitive device above a slot in the container are associated with circuitry for transmitting the position of the disc. (Author)

Patent 3,207,034 Field 17H, 13J

STREAMLINED FIBER FASCICULUS SUBMARINE PERISCOPE.
Patent assigned to Navy,
by James R. R. Harter. 21 Sep 65

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Submarine periscopes, Fiber optics), (*Fiber optics, Submarine periscopes), Glass textiles, Fluid dynamic properties, Configuration.

The periscope structure includes a housing, lens, eyepiece lens and a bundle of glass fibers. The use of the glass fibers as the transmitting element in the optical system permits a more streamlined shape of the periscope housing which passes through the water. The streamlined shape does not cause large disturbances on the surface of the water when the submarine is moving.

Patent 3,208,071 Field 17B

RECEIVER DISTRIBUTION SYSTEM.

Patent assigned to Navy,
by Jack R. Potthoff. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.50

Descriptors: (*Antenna feeds, Radio receives), (*Radio receives, Distribution), Radio communication systems, Patents.

The system is particularly suited for permitting the simultaneous operation of several communication receivers from one or more broadcast antennas. A distribution system is provided with couplers which absorb and transfer to the associated receiver a large percentage of the available power from the transmission system on the operating channel, and which present a high impedance compared to the characteristic impedance of the transmission system with little power absorption and transfer at all other frequencies within the associated frequency spectrum.

TID-21630 Field 17J
CFSTI Prices: HC$1.00 MF$0.50

Nevada Operations Office (AEC), Las Vegas.
PROJECT DRIBBLE.
1 Aug 64, 23p
Unclassified report

Descriptors: (*Nuclear explosion, Seismology), (*Seismology, Nuclear explosion).

UCRL-13132 Field 17B, 20N
CFSTI Prices: HC$2.00 MF$0.50

Electronics Research Lab. Montana State Coll.
TELEMETRY SYSTEM STUDY.
Final rept.
Sep 64, 30p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Telemeter systems, Multiplex), (*Microwave equipment, Telemeter systems).

## 18. Nuclear Science and Technology

APEX-502 Field 18J
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Cincinnati, Ohio. Aircraft Nuclear Propulsion De Pt.
XMA-1 SHIELDING TESTS USING SLABS OF ADVANCED SHIELDING MATERIALS,
by R. H. Clark. Jul 58, 26p Unclassified report
Contract AF33/600/38062

Descriptors: (*Shielding, Materials).

AP-NOTE-418 Field 18J
CFSTI Prices: HC$1.00 MF$0.50

ALCO Products, Inc., Schenectady, N. Y. Nuclear Power Engineering Dept.
A SURVEY OF STRAIN-CYCLING DATA ON TYPICAL ARMY-REACTOR VESSEL MATERIALS,
by J. J. Naple. 1 May 62, 9p Unclassified report
Contract AT30 1 2639

Descriptors: (*Reactor materials, Fatigue(Mechanics)), (*Fatigue(Mechanics), Reactor materials).

AP-NOTE-430 Field 18L
CFSTI Prices: HC$2.00 MF$0.50

ALCO Products, Inc., Schenectady, N. Y. Nuclear Power Engineering Dept.
REPORT ON NATURAL CONVECTION CAPABILITY OF SM-1,
by P. L. Bradley. 11 Jul 62, 42p
Contract AT30 1 2639
Unclassified report

Descriptors: (*Power reactors, Operation).

BAW-1280-24 Field 18E, 18I
CFSTI Prices: HC$3.00 MF$0.75

Babcock and Wilcox Co., Barberton, Ohio. Boiler Div.
SODIUM-HEATED STEAM GENERATOR DEVELOPMENT.
Progress rept. no. 22, Feb 65.
1965, 71p
Contract AT11 1 1280
Unclassified report

Descriptors: (*Heat exchangers, Nuclear power plants), (*Boilers, Nuclear power plants).

BMI-X-151 Field 18J
CFSTI Prices: HC$3.00 MF$0.75

Battelle Memorial Inst., Columbus, Ohio.
SURVEY OF ZIRCONIUM, YTTRIUM, AND CERIUM HYDRIDES FOR REFLECTOR APPLICATION IN THE GCRE,
by J. M. Fackelmann, M. A. Gedwill, Jr., and H. N. Krause, Jr. 7 Mar 60, 86p
Contract W-7405-eng-92
Unclassified report

Descriptors: (*Reactor moderators, Reflectors), (*Zirconium compounds, Hydrides), (*Yttrium compounds, Hydrides), (*Cerium compounds, Hydrides).

BMI-X-10118 Field 18G, 18J
CFSTI Prices: HC$1.00 MF$0.50

Battelle Memorial Inst., Columbus, Ohio.
FISSION-PRODUCT REACTIONS WITH AND RELEASE FROM FUEL-ELEMENT CLADDINGS.
Quarterly progress rept. for Jan-Mar 65,
by Duane N. Sunderman, David L. Morrison, and James E. Howes, Jr. 1 Apr 65, 7p EURAEC-1364
Contract W7405eng92
Unclassified report

Descriptors: (*Fission product activity, Reactor fuel cladding), (*Reactor fuel cladding, Fission product activity).

BMI-X-10121 Field 18J
CFSTI Prices: HC$1.00 MF$0.50

Battelle Memorial Inst., Columbus, Ohio.
FISSION-FRAGMENT EFFECTS IN STRUCTURAL MATERIALS.
Quarterly progress rept. for Jan-Mar 65,
by Robert L. Ritzman, Neal M. Griesenauer, and Edward J. Jablonowski. 1 Apr 65, 8p EURAEC-1370
Contract W7405eng92
Unclassified report

Descriptors: (*Reactor fuel cladding, Radiation damage), Stainless steel, Zirconium alloys, Fission products, Fission neutrons.

BNL-923 Field 18H, 18B
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
THE BROOKHAVEN CO60 SOURCE ASSAY UNIT - AN INSTRUMENT FOR MEASURING AND RECORDING THE ACTIVITY OF CO 60 SOURCE ELEMENTS,
by A. C. Muller, S. Silverman, O. A. Kuhl, and L. Galanter. Apr 65, 9p BNL-T-380
Contract AT(30-2)-GEN-16

Unclassified report

Descriptors: (*Cobalt, Radioactive isotopes), (*Radiation measurement systems, Cobalt).

BNL-9032 Field 18B, 6R
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
TECHNETIUM-99M -- PRODUCTION AND CHEMISTRY,
by P. Richards. 23 Mar 65, 16p CONF-650313-1
Contract AT30 2GEN 16

Unclassified report

Prepared for presentation at Symposium on Nuclear Medicine, Philadelphia.

Descriptors: (*Technetium, Manufacturing methods), (*Radioactive isotopes, Technetium), Tracer studies.

BNL-9129 Field 18D, 20H
CFSTI Prices: HC$2.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
MEDIUM ENERGY SEPARATED BEAM TO THE 31-IN. BUBBLE CHAMBER,
by H. N. Brown. 1 Apr 65, 27p HNB-3
Contract AT30 2GEN16

Unclassified report

Descriptors: (*Bubble chambers, Particle beams), (*Particle beams, Bubble chambers).

BNL-9160 Field 18H, 11I
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
RADIATION DAMAGE IN MYLAR EXPOSED TO MINIMUM IONIZING PROTONS,
by J. J. Hennessy and W. H. Moore. 6 Apr 65, 14p AADD-77
Contract AT-30-2-GEN-16

Unclassified report

Descriptors: (*Polyester plastics, Radiation damage), (*Radiation damage, Polyester plastics), Films, Protons.

BNL-9174 Field 18J, 7B
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
CHEMICAL STATE OF IODINE RELEASED FROM IRRADIATED FUELS INTO STREAM,
by A. W. Castlemen, Jr, I. N. Tang, and H. R. Munkelwitz. Apr 65, 18p CONF-650407-3
Contract AT(30-2)-GEN-16

Unclassified report

Presented at the International Symposium on Fission Product release and transport under Accident Conditions, Oak Ridge, Tenn.

Descriptors: (*Reactor fuels, Iodine), (*Fission products, Iodine), (*Iodine, Fission products).

BNWL-23 Field 18H, 18J
CFSTI Prices: HC$1.00 MF$0.50

Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
IRRADIATION EFFECTS ON HIGH TEMPERATURE REACTOR STRUCTURAL METALS,
by T. T. Claudson and H. J. Pessl. Feb 65, 23p
Contract AT45 1 1830

Unclassified report

Descriptors: (*Radiation damage, Metals), (*Reactor materials, Radiation damage).

BNWL-24 Field 18H, 11F
CFSTI Prices: HC$1.00 MF$0.50

Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PHYSICAL PROPERTY CHANGES IN THORIUM POSTIRRADIATION ANNEALED TO 950 C,
by R. D. Leggett. Jan 65, 20p
Contract AT45 1 1830

Unclassified report

Descriptors: (*Thorium, Radiation damage), (*Heat treatment, Throium).

BNWL-26 Field 18I
CFSTI Prices: HC$1.00 MF$0.50

Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
INSTRUMENTATION DEVELOPMENT FOR THE CONTAINMENT SYSTEMS EXPERIMENT,
by C. E. Huck. 3 Feb 65, 12p
Contract AT45 1 1850

Unclassified report

Descriptors: (*Containment, Instrumentation).

BNWL-46 Field 18B
CFSTI Prices: HC$1.00 MF$0.50

Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PURIFICATION OF STRONTIUM-90 FROM MAGNESIUM,
by L. A. Bray. 15 Mar 65, 8p
Contract AT(45-1)-1830

Unclassified report

Descriptors: (*Strontium, Purification), (*Magnesium, Solvent extraction).

CONF-650416-1 Field 18N, 21F
CFSTI Prices: HC$1.00 MF$0.50

Pratt and Whitney Aircraft, Middletown, Conn. Aircraft Nuclear Engine Lab.
THE SNAP-50/SPUR NUCLEAR-ELECTRIC SPACE POWERPLANT PROGRAM,
by Elwood M. Douthett and Robert I. Strough. 28 Apr 65, 18p
Contract AT(30-1)-2789

Unclassified report

Prepared for presentation at Symposium on Advanced Propulsion Concepts (4th), Palo Alto, Calif.

Descriptors: (*Nuclear power plants, Spacecraft nuclear propulsion), (*Liquid metal cooled reactors, Nuclear power plants).

DLCS-5001264 Field 18L
CFSTI Prices: HC$2.00 MF$0.50

Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT ON PWR OPERATIONS, DECEMBER 1964.
Dec 64, 35p
Contract AT(11-1)-292
Unclassified report

Descriptors: (*Power reactors, Reactor operation), (*Reactor operation, Maintenance).

EGG-1183-1003 Field 18N
CFSTI Prices: HC$1.00 MF$0.50

Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.
SNAP-TRAN EXPOSURE VALUES BASED ON TRIGA REACTOR PHOTOGRAPHY RESULTS,
by Robert A. Meibaum. 20 Nov 63, 23p
Contract AT(2901)-1183
Unclassified report

Descriptors: (*Reactor cores, Cerenkov radiation), (*Cerenkov radiation, Intensity).

GA-4569 Field 18I, 18L
CFSTI Prices: HC$3.00 MF$0.75

General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
TARGET -- A PROGRAM FOR A 1000-MW(E) HIGH-TEMPERATURE GAS-COOLED REACTOR.
Quarterly progress rept. for 31 Aug 63.
27 Sep 63, 65p
Contract AT04 3 167
Unclassified report

Descriptors: (*Gas-cooled reactors, Nuclear engineering), (*Nuclear engineering, Gas-cooled reactors).

GA-4937 Field 18L
CFSTI Prices: HC$2.00 MF$0.75

General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
TARGET -- A PROGRAM FOR A 1000-MW(E) HIGH-TEMPERATURE GAS-COOLED REACTOR.
Quarterly progress rept. for period ending 30 Nov 63.
21 Feb 64, 50p
Contract AT(04-3)-167
Unclassified report

Descriptors: (*Gas-cooled reactors, Design).

GA-5559 Field 18I, 13K
CFSTI Prices: HC$4.00 MF$1.00

General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
INVESTIGATION OF TURBOCIRCULATOR FOR TARGET, A 1000-MW(E) REACTOR.
Summary rept.,
by J. Yampolsky, V. Barbat, H. Berman, and L. Todt. 28 Sep 64, 130p
Contract AT(04-3)-167
Unclassified report

Descriptors: (*Turbopumps, Gas-cooled reactors), (*Nuclear power plants, Turbopumps).

GAMD-5278 Field 18J
CFSTI Prices: HC$1.00 MF$0.50

General Atomic, San Diego, Calif.
TARGET PCRS PROGRAM -- FIRST PLASTIC MODEL, EXPERIMENTAL RESULTS AND NUMERICAL ANALYSIS,
by C. Riparbelli. 25 Nov 64, 21p
Contract AT04 3 167
Unclassified report

Descriptors: (*Reactor materials, Stresses), (*Models-(Simulations), Reactor materials).

GAMD-5411 Field 18J, 9B
CFSTI Prices: HC$5.00 MF$1.50

General Atomic, San Diego.
GASP -- A COMPUTER CODE FOR BURNUP INDEPENDENT POWER SHAPING BY FUEL ZONING,
by K. R. Van Howe. 7 Dec 64, 154p
Contract AT04 3 167
Unclassified report

Descriptors: (*Reactor fuel processing, Programming-(Computers)), (*Programming(Computers), Reactor fuel processing).

GEMP-48A Field 18J, 18H, 11B
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Cincinnati, Ohio. Nuclear Materials and Propulsion Operation.
HIGH-TEMPERATURE MATERIALS PROGRAM.
Progress rept. no. 48, Part A.
25 Jun 65, 30p
Contract AT(40-1)-2847
Unclassified report

Descriptors: (*Reactor materials, High-temperature research), (*Radiation damage, Reactor materials).

HW-83480 Field 18D
CFSTI Prices: HC$3.00 MF$0.75

Hanford Atomic Products Operation, Richland, Wash.
6144-CHANNEL TIME-OF-FLIGHT ANALYZER,
by R. A. Walker and J. T. Russell. Sep 64, 76p
Contract AT(45-1)-1350
Unclassified report

Descriptors: (*Neutron detectors, Neutron scattering).

N65-21724 Field 18F, 22A
CFSTI Prices: HC$1.00 MF$0.50

Naval School of Aviation Medicine, Pensacola, Fla.
RADIATION EXPOSURE IN SOLAR PARTICLE BEAMS BEHIND VERY LOW SHIELDING,
by Hermann J. Schaefer. 19 Feb 65, 14p
Rept. no. NSAM-914
NASA CR-62198
Unclassified report

Descriptors: (*Solar radiation, Astronauts), (*Astronauts, Shielding), Pressure suits, Particle beams.

Patent 3,198,709 Field 18J

NUCLEAR REACTOR CONTROL ROD ASSEMBLY WITH IMPROVED DRIVING MECHANISM.
Patent assigned to NASA,
by John W. Macomber. 3 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Control rods, Drives), (*Drives, Control rods), Reactor control, Reactor safety systems, Reactor system components, Positioning devices(Machinery), Mecanical drawings, Patents.

The control rod assembly is for regulating the power level in a nuclear reactor. The control rod driving mechanism is located below the reactor core. The structure includes an improved device for scramming the control rod in case of a dangerous power excursion within forty milliseconds.

Patent 3,202,475 Field 18J

METHOD FOR COLLECTING ZIRCONIUM TETRACHLORIDE.
Patent assigned to AEC,
by Theodore A. Gens. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor fuel processing, Collecting methods), (*Zirconium, Separation), Zirconium compounds, Chlorides, Reactor fuels, Uranium, Plutonium, Vapors, Jets, Patents, Vaporization.

A neutron-irradiated nuclear fuel composition containing zirconium and a nuclear fuel selected from uranium and plutonium is treated by hydrochlorination of the composition with gaseous hydrogen chloride at from 350 to 800 degrees C. to selectively volatilize zirconium tetrachloride and volatilize fission product chloride. An improvement in this process involves contacting a jet stream of zirconium tetrachloride-containing vapor with the vapor in equilibrium above refluxing water.

Patent 3,202,586 Field 18J, 11B

METHOD FOR CONTROLLING THE COMPOSITION OF URANIUM CARBIDE AND NUCLEAR FUEL ELEMENT THEREOF.
Patent assigned to AEC,
by Bradley A. Webb and Nathan R. Koenig. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Uranium compounds, Carbides), (*Reactor fuel elements, Reactor fuel processing), Reactor fuel cladding, Stainless steel, Uranium alloys, Carbon alloys, Molybdenum alloys, Chromium alloys, Beryllium alloys, Tungsten alloys, Silicon alloys, Vanadium, Heat treatment, Patents.

The method prevents carbon transfer from hyperstoichimetric uranium carbide fuel to stainless steel cladding. Uranium monocarbide, or UC, shows promise as a fuel material for high temperature nuclear reactors. Stoichiometric uranium carbide free of UC2 or unalloyed uranium may be obtained by adding a metal to the carbide which has a free energy of formation value for its carbide which is intermediate to UC and UC2. Such a metal forms a second carbide phase with any carbon present in excess of that required for stoichiometric UC.

Patent 3,202,819 Field 18D

BETA AND GAMMA MEASURING APPARATUS FOR FLUIDS.
Patent assigned to Navy,
by Charles Christianson. 24 Aug 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Fluids, Radioactivity), (*Radiation measurement systems, Design), Beta particles, Gamma rays, Samplers, Patents.

The portable apparatus is for collecting atmosphere or other gas samples free of particulate matter and containing radioactive gases which are by-products of nuclear reactor operation or other sources. The apparatus makes measurements to identify the radioactive constituent and to ascertain the activity in the sample.

Patent 3,205,139 Field 18E

HIGH TEMPERATURE REACTOR WITH SPECIFIC DISTRIBUTION OF NON-1v. ABSORBER AND FERTILE MATERIAL.
Patent assigned to AEC,
by Hugh B. Stewart and Edward J. Leshan.
7 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Gas-cooled reactors, Reactor control), (*Reactor control, Gas-cooled reactors), Reactor moderators, Distribution, Reactor reactivity, Reactor materials, Reactor coolants, Burnable poisons, Patents.

The high temperature nuclear reactor has improved safety characteristics by virtue of particular distributions of materials in the reactor. The reactor is gas cooled and generates high temperature steam. Non-1/v. absorbers are placed selectively in the hotter upper central part, whereas resonance absorbers, preferably fertile materials such as thorium-232 and uranium-238, are placed in the cooler lower outside portions.

Patent 3,205,141 Field 18L

SIMULATED FUEL ASSEMBLY.
Patent assigned to NASA,
by Joseph M. Savino and Chester D. Lanzo.
7 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor fuel processing, Simulation), Fluid flow, Reactor coolants, Flowmeters, Reactor fuel elements, Patents.

The nuclear reactor is of the type having at least one fuel assembly located at a predetermined position therein with elements for circulating coolant through the fuel assembly. An arrangement is shown for duplicating the pressure loss versus flow rate characteristics of the fuel assembly and measuring the flow rate of the coolant. The structure includes a housing, a flow meter and a flow resistor. (Author)

Patent 3,205,149 Field 18F

FUSE DEVICE FOR A NUCLEAR REACTOR.
Patent assigned to AEC,
by Glen V. Brynsvold and Katsumi Hikido.
7 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reactor safety fuzes, Patents), Reactor reactivity, Neutron flux, Plastics, Deformation, Uranium, Isotopes.

The fuse device actuates elements for reducing reactivity in a nuclear reactor. A prestressed fuse pin is utilized in the fuse link body. It is actuated as the pin reaches a temperature at which plastic deformation of uranium or U-235 or U-233-containing material can occur. (Author)

PB-168 468 Field 18K
CFSTI Prices: HC$2.00 MF$0.50

Commissariat a l'Energie Atomique, Cadarache (France). Centre d'Etudes Nucleaires.
NEUTRON DENSITY DECAY CONSTANT IN A NON-MULTIPLYING LATTICE OF FINITE SIZE (Constante de Decroissance de la Densite Neutronique dans un Reseau Non-Multiplicateur de Dimensions Finies),
by Valentine C. Deniz. Jul 65, 47p
Rept. no. CEA-R-2702 Unclassified report

Text in French with attached summary in English.

Descriptors: (*Neutron transport theory, Integral equations), Neutron flux, Decay schemes, Reactor lattice parameters.

This report presents a general theory, using the integral transport method, for obtaining the neutron density decay constant in a finite non-multiplying lattice. The theory is applied to obtain the expression for the diffusion coefficient. The case of a homogeneous medium with 1/v absorption and of finite size in all directions is treated in detail, assuming an isotropic scattering law. The decay constant is obtained up to the B(6) term. The expressions for the diffusion coefficient and for the diffusion cooling coefficient are the same as those obtained for a slab geometry by NELKIN, using the expansion in spherical harmonics of the Fourier transform in the spatial variable. Furthermore, explicit forms are botained for the flux and the current. It is shown that the deviation of the actual flux from a Maxvellian is the flux generated in the medium, extended to infinity and deprived of its absorbing power, by various sources, each of which has a zero integral over all velocities. The study of the current permits the generalization of Fick's law. An independent integral method, valid for homogeneous media, is also presented.

PB-168 470 Field 18K
CFSTI Prices: HC$4.00 MF$1.00

Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ALECTO-RESULTS OBTAINED WITH HOMOGENEOUS CRITICAL EXPERIMENTS ON PLUTONIUM 239, URANIUM 235 AND URANIUM 233 (ALECTO-Resultats des Experiences Critiques Homogenes Realisees sur le Plutonium 239, l'Uranium 235 et l'Uranium 233),
by Jean-Georges Bruna, Jean-Paul Brunet, Robert Caizergues, Christian Clouet D'Orval, and Jacques Kremser. Oct 65, 136p Rept. no. CEA-R-2814
Unclassified report

Text in French attached summary in English.

Descriptors: (*Critical assemblies, Homogeneous reactors), Reactor kinetics, Plutonium, Uranium, France.

The results are given of homogeneous critical experiments ALECTO, made on plutonium 239, uranium 235 and uranium 233. After a brief description of the equipment, the critical masses for cylinders of diameters varying from 25 to 42 cms, are given and compared with other values (foreign results, criticity guide). Experiments relating to cross sections and constants to be used on these materials are presented. Lastly, kinetic experiments allow comparison of pulsed neutron methods to fluctuation methods. (Author)

PNE-719P Field 18C, 8G
CFSTI Prices: HC$3.00 MF$0.75

Army Engineers Waterways Experiment Station, Vicksburg, Miss.
PRESHOT GEOLOGIC INVESTIGATIONS.
Rept. on Proj. SULKY,
by R. C. Nugent and D. C. Banks. Mar 65, 92p
Unclassified report

Descriptors: (*Nuclear explosions, Test facilities), (*Engineering geology, Nuclear explosions).

TID-21812 Field 18H
CFSTI Prices: HC$1.00 MF$0.50

Michigan Univ., Ann Arbor.
GAMMA SPECTRA FROM THE DECAY OF NEUTRON DEFICIENT ISOTOPES,
by D. F. Donnelly an M. L. Wiedenbeck.
1963, 8p
Contract AT(11-1)-1112
Unclassified report

Descriptors: (*Radioactive isotopes, Radioactive decay), (*Radioactive decay, Gamma spectra), Fast neutrons.

TID-21844 Field 18D
CFSTI Prices: HC$2.00 MF$0.50

Washington Univ., Seattle.
CALIBRATION OF A SILICON SURFACE-BARRIER DETECTOR TO READ NEUTRON DOSE INDEPENDENT OF INCIDENT NEUTRON ENERGY.
Master's thesis,
by Alfred John Ahlquist. 1965, 42p
Unclassified report

Descriptors: (*Radiation measurement systems, Calibration), (*Silicon, Radiation measurement systems), Neutron detectors, Neutron counters.

UNC-5081 Field 18J, 11B
CFSTI Prices: HC$3.00 MF$0.75

United Nuclear Corp., White Plains, N. Y. Development Div.
CARBIDE FUEL DEVELOPMENT. PHASE V.
Rept. for 1 Oct 62-30 Sep 64,
by A. Strasser, D. Stahl, and K. Taylor. 30 Jun 64, 97p
Contract AT(30-1)-2899, Proj. 2192
Unclassified report

Descriptors: (*Reactor fuels, Carbides), (*Carbides, Reactor fuels), Uranium compounds, Plutonium compounds.

UNC-5094 Field 18J, 11B
CFSTI Prices: HC$3.00 MF$0.75

United Nuclear Corp., White Plains, N. Y. Development Div.
CARBIDE FUEL DEVELOPMENT.
Progress rept. for 1 Oct 63-30 Jun 64,
by A. Strasser and D. Stahl. 9 Sep 64, 74p
Contract AT(30-1)-2899, Proj. 2320
Unclassified report

Descriptors: (*Reactor fuels, Carbides), (*Carbides, Reactor fuels), Uranium compounds, Plutonium compounds.

USNRDL-TR-816 Field 18B, 18G
CFSTI Prices: HC$1.00 MF$0.50

Naval Radiological Defense Lab., San Francisco, Calif.
NEAR-SYMMETRIC FISSION-IDENTIFICATION AND YIELD OF CD 121,
by H. V. Weiss. 1 Feb 65, 12p
Contract AT(49-2)-1167

Unclassified report

Descriptors: (*Fission products, Identification), (*Isotope separation, Cadmium).

## 19. Ordnance

Patent 3,202,382 Field 19G

ROCKET YAW CONE REDUCTION DEVICE.
Patent assigned to Navy,
by Talbot A. Chubb. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Rockets, Stabilization systems), (*Yaw, Reduction), Control systems, Rocket components, Power supplies, Circuits, Gyro stabilizers, Flywheels, Gimbals, Patents.

The rocket stabilizers are for controlling the behavior of spinning rockets in space. All components of the stabilizer are contained within the rocket and are completely isolated from the rocket's external environment. Components of the system include a power source, a control circuit, a rate gyro, a flywheel, a flywheel motor and a gimbaled yoke.

Patent 3,204,361 Field 19F

LARGE CAPACITY MAGAZINE FOR FIREARMS.
Patent assigned to Army,
by John G. Rocha. 7 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Feed mechanisms, Small arms), Cartridges, Storage, Firing mechanisms-(Ammunition), Patents.

The box-type magazine permits increased cartridge capacity by increasing the width to several times the diameter of the cartridge without increasing the profile. The cartridges are successively displaced to a feeding position in the mouth of the magazine by an elastic band. Any "log jams" are cleared by weapon recoil thrust with attendant vibration of the magazine and the cartridges.

Patent 3,204,529 Field 19F

CONTROLLED BURST FIRING MECHANISM.
Patent assigned to Army,
by Stanley D. Silsby. 7 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Firing mechanisms(Weapon), Small arms), Control systems, Patents.

The firing mechanism for rifles is easily adjusted for semiautomatic, automatic and controlled burst firing. The rifle is more effective when fired in controlled burst firing position. The rifle is adjusted by turning a selector knob. In the burst firing position the rifle fires three rounds each time the trigger is pulled.

Patent 3,204,531 Field 19F

FIREARM DRIVE SPRING DEVICE.
Patent assigned to Army,
by Henry P. Swieskowski. 7 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Firing mechanisms(Weapon), Automatic weapons), Springs, Bolts, Patents.

The firearm spring device is for use in automatic firearms. The device has an auxiliary drive spring which assists the main drive spring in providing the required force against the bolt when in battery position, so that the preload of the main drive spring can be proportionately reduced. The auxiliary drive spring is active against the bolt only when the bolt is adjacent battery position.

Patent 3,205,846 Field 19H

TORPEDO BODY FORM AND GAS LAYER CONTROL.
Patent assigned to Navy,
by Thomas G. Lang. 14 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Torpedo components, Drag), (*Drag, Boundary layer control), Gas flow, Reduction, Patents.

A torpedo structure is disclosed in which only a small portion of the nose and tail sections are in direct contact with the ambient water and wherein the large majority of the torpedo length is effectively immersed and traveling through a substantially inviscate gaseous medium. Accordingly, the frictional resistance or drag upon surfaces of the mid-section is essentially identical to that which would result if traveling through gas rather than water, with resultant overall reduction of drag of a torpedo. This construction and arrangement reduces the skin friction resistance of torpedoes over that presently existing by as much as a factor of four or five.

Patent 3,206,820 Field 19A, 13E

LANYARD OPERATED LATCH.
Patent assigned to Navy,
by Ernest T. Long. 21 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Release mechanisms, Design), (*Arming devices, Ordnance), Patents, Bombs, Pyrotechnics, Warning systems.

The lanyard operated latch is attached to a bomb to be dropped from an aircraft and a cord attached to the latch is attached at its other end to the aircraft. The retainer is in the form of a soft metal disk notched at opposite points and held in place at these points by a screw and a positioning element, and a lanyard attached to the disk and adapted by a pull from any direction to release the retainer.

Patent 3,207,036 Field 19F

COMBINATION INTERNAL RETAINING RING, ADJUSTABLE POSITIONER AND SWIVEL BEARING FOR GUNS.
Patent assigned to Army,
by Leo F. Norton. 21 Sep 65 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Gun components, Rings), (*Spotting rifles, Gun components), Small arms, Gas cylinders, Bearings, Mechanical fasteners, Patents.

The pop-ring is easily installed and replaced in a gun and serves as a swivel bearing, an internal retainer, and an adjustable positioner. The pop-ring is installed in the gas cylinder of a spotting rifle type of gun which is mounted on a basic weapon of the artillery type.

Patent 3,207,071 Field 19B, 15B

LIGHT HIGH EXPLOSIVE BOMB FOR DISPERSING TOXIC AND INSECTICIDAL AEROSOLS.
Patent assigned to Army,
by Robert L. LeTourneau. 21 Sept 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Chemical bombs, Insecticides), (*Insecticides, Chemical bombs), Plastics, Aerosols, Patents.

The bomb can be dropped from high altitudes for the dissemination of insecticides. The frangible plastic bomb is provided with an axial high explosive bursting charge and is filled with a liquid or a suspension of finely divided solids in liquids.

Patent 3,207,074 Field 19H, 11I

PLASTICS PROJECTOR CHARGE CARTRIDGE CASE.
Patent assigned to Navy,
by Marlin A. Kinna and Stanley P. Prosen. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Plastics, Cartridge cases), (*Cartridge cases, Antisubmarine ammunition), Antisubmarine weapon projectors, Patents.

The cartridge case contains the projector charge for an antisubmarine weapon which is explosively launched from the deck of a ship. The case is made primarily of plastics, the several parts being secured together by special molding and welding techniques which result in moisture tight seals.

UCRL-13119 Field 19D, 18C
CFSTI Prices: HC$2.00 MF$0.50

Hydraulic Engineering Lab., Univ. of California, Berkeley.

A STUDY OF WATER WAVES PRODUCED BY IMPACT LOADS ON UNCONFINED GROUND WATER AQUIFERS,
by Daniel K. Sunada and David K. Todd. 30 Jun 64, 42p
Contract AT(11-1)-34
Unclassified report

Descriptors: (*Explosion effects, Nuclear explosions), (*Water waves, Explosion effects).

## 20. Physics

AD-406 904 Field 20H, 20M
CFSTI Prices: HC$3.00

Westinghouse Research Labs., Pittsburgh, Pa. Physics Dept.
SPATIALLY DEPENDENT ENERGY DISTRIBUTIONS FOR ELECTRONS DRIFTING THROUGH A GAS IN A UNIFORM ELECTRIC FIELD.
Rept. on Project Defender,
by James H. Parker, Jr. 1963, 55p
Technical rept. no. TR-18
Contract Nonr258400, Proj. 2720, ARPA Order 125 62
Unclassified report

Descriptors: (*Electrons, Transport properties), (*Transport properties, Electric fields), Gases, Kinetic theory, Diffusion, Elastic scattering, Energy, Distribution theory, Thermodynamics.

The steady state distribution function is obtained for electrons initially emitted from a point source into a neutral gas and which subsequently drift under the influence of a uniform dc electric field while undergoing elastic collisions with the gas atoms. The usual approximations are retained of regarding the distribution function as almost spherical in velocity space and of regarding the fractional energy gain or loss by an electron upon collision as small. However, the terms in the Boltzmann transport equation involving spatial derivatives of the distribution, which are usually assumed small in comparison to the field and collision terms, are treated exactly. The distribution function is given as a sum of energy modes, each of which decay with distance from the source. The lowest of these modes is the far-distant distribution, while the higher ones, which decrease more rapidly with distance, describe the decay of the initial source energy distribution. The complete distribution is obtained in terms of known functions in the case of an energy independent collision frequency, whereas in the energy independent cross section case, only the lowest mode is obtained.

AD-409 863 Field 20H
CFSTI Prices: HC$1.00

Westinghouse Research Labs., Pittsburgh, Pa. Physics Dept.
RESONANCES IN THE ELASTIC SCATTERING OF ELECTRONS ON ATOMS AND MOLECULES.
Rept. on Proj. Defender,
by G. J. Schulz. 1963, 9p Technical rept. no. TR-21
Contract Nonr258400, Proj. 2720, ARPA Order 125 62
Unclassified report

Descriptors: (*Elastic scattering, Electrons), (*Resonance, Elastic scattering), Atoms, Molecules, Atomic energy levels, Excitation.

Experimental evidence is presented for the existence of compound states in simple atomic and molecular systems. The experimental evidence for these compound

states comes from the observation of the elastic and inelastic cross section by electron impact. Once formed, the compound state can decay into any state of the atoms which lies below it; namely, back to the ground state of the atom or molecule (elastic scattering), to an electronically excited state of the atom or molecule, to vibrational states of the molecule, or to a negative ion plus a neutral fragment. The compound states discussed in this paper occur below the first electronically excited state of the atom or molecule; they have been observed in helium and neon atoms, and in the molecules nitrogen, carbon monoxide, and nitrous oxide. (Author)

AD-410 599 Field 20H
CFSTI Price: HC$1.00

Westinghouse Research Lab., Pittsburgh, Pa.
Physics Dept.
TRANSPORT COEFFICIENTS AND CROSS SECTIONS IN ARGON AND HYDROGEN-ARGON MIXTURES.
Rept. on Proj. DEFENDER,
by A. G. Engelhardt and A. V. Phelps. 1963, 19p
Technical rept. no. TR-20
Contract Nonr258400, ARPA order125 62
Unclassified report

Descriptors: (*Transport properties, Electrons), Hydrogen, Argon, Mixtures, Energy, Probability, Distribution theory, Inelastic scattering, Elastic scattering, Kinetic theory.

Using a method described previously the distribution function of electron energies for electrons in argon and mixtures of hydrogen and argon has been obtained by a numerical solution of the Boltzmann equation which takes into account elastic and inelastic collisions. By taking appropriate averages over the distribution function, the electron drift velocity, magnetic drift velocity, and characteristic energy are computed. A comparison of calculated and experimental values of these transport coefficients allows, in the case of pure argon, extension of the previous work of Frost and Phelps and derivation of the momentum transfer cross section from 0.7 to 25.0 eV. The momentum transfer and inelastic collision cross sections derived in this paper for argon and previously for hydrogen give rise to transport coefficients in mixtures of these two gases which are consistent with most of the available experimental data. (Author)

AD-410 823 Field 20H
CFSTI Price: HC$1.00

Westinghouse Research Labs., Pittsburgh, Pa.
Physics Dept.
RECENT STUDIES OF VIBRATIONAL EXCITATION OF N2 BY ELECTRON IMPACT.
Rept. on Proj. DEFENDER,
by G. J. Schulz. 1963, 9p Technical rept. no. TR-19
Contract Nonr258400, ARPA order125 62
AD 412 873 canceled
Unclassified report

Descriptors: (*Excitation, Nitrogen), (*Electron bombardment, Excitation), Vibration, Molecules, Atomic energy levels.

The vibrational excitation of nitrogen molecules by electron impact was studied using a double electrostatic analyzer. The forward scattered electrons were analyzed for energy losses and it was found that vibrational levels were excited up to the eighth level when the incident electron energy was between 1.7 and 3.5 eV. The experiment had two deficiencies, namely (a) the elastically scattered electrons could not be distinguished from the primary beam since there is essentially no energy loss connected with the elastically scattered electrons and (b) the cross section to the first vibrational level, v = 1, could not be measured because the residual background current from the primary beam was too high. Both these deficiencies are associated with the fact that electrons were analyzed in the forward direction. The present experiment overcomes both these deficiencies by analzing electrons at another angle, which is arbitrarily chosen as 72 degrees. (Author)

AD-419 656 Field 20H
CFSTI Price: HC$3.00

Westinghouse Research Labs., Pittsburgh, Pa.
Physics Dept.
ELASTIC AND INELASTIC COLLISION CROSS SECTIONS IN HYDROGEN AND DEUTERIUM FROM TRANSPORT COEFFICIENTS.
Rept. on Proj. DEFENDER,
by A. G. Engelhardt and A. V. Phelps. 22 Feb 64, 62p
Technical rept. no. TR-17; Scientific paper 63-928-113-P1
Contract Nonr258400, Proj. 7200; ARPA Order 125 61
Unclassified report

Descriptors: (*Elastic scattering, Probability), (*Inelastic scattering, Probability), (*Transport properties, Electrons), Hydrogen, Deuterium, Electric fields, Excitation, Vibration, Molecular rotation, Ionization.

By means of a numerical solution of the Boltzmann equations, elastic and inelastic collision cross sections have been derived for electrons in H2 and D2 subjected to a dc electric field. The cross sections for momentum transfer, rotational excitation, vibrational excitation, electronic excitation, and ionization are investigated by comparing experimental and theoretical values of transportation coefficients. The same momentum transfer cross section previously obtained for H2 by Frost and Phelps has been found to be valid for D2. Good agreement is secured between experiment and theory by multiplying the theoretical rotational cross sections of Gerjuoy and Stein by approximately 1.5 provided the polarization factor of Dalgarno and Moffet is used. The final cross section for vibrational excitation of H2 has a threshold at 0.52 eV and a peak of 7.7 x 10 to the -17th power cm. sq. at 4.5 eV, whereas that of D2 has a threshold at 0.36 eV and a peak of 6.6 x 10 to the -17th power cm. sq. at 4.7 eV. The derived electronic excitation cross sections are the same for both H2 and D2. (Author)

AD-440 195 Field 20F, 7D
CFSTI Price: HC$4.00

Naval Ordnance Lab., Corona, Calif.
PROCEEDINGS: FAR INFRARED PHYSICS SYMPOSIUM, JANUARY 20-21, 1964, MISSION INN, RIVERSIDE, CALIFORNIA.
1964, 116p Unclassified report
N64 29477 - 29483

Descriptors: (*Infrared spectroscopy, Symposia), Interferometers, Infrared radiation, Integral transforms, Solid state physics, Magneto-optic effect, Semiconductors.

Topics presented include: Some experiences with interferometric techniques in the far infrared; High magnetic field for infrared radiation sources; High resolution Fourier transform interferometry in the far infrared; Far infrared spectroscopy of solids; Far infrared magneto-optical studies of semiconductors; Size effects in infrared lattice absorption.

AD-443 785 Field 20E
CFSTI Price: HC$1.00

Ohio State Univ. Research Foundation, Columbus.
Antenna Lab.

PEAK POWER LIMITER FOR LARGE LASER PULSES,
by R. G. Tomlinson and E. K. Damon. 1 Jul 64, 13p
Rept. no. 1579-13
Contract AF33 657 10824, Proj. 5237, Task 523704
N64 32875

Unclassified report

Descriptors: (*Lasers, Limiters), Power, Ruby, Design, Light pulses, Optical equipment.

A device is described which limits the peak amplitude of a high power laser pulse. Control is achieved through an electrodeless discharge produced by the laser pulse in a gas or liquid. For a properly designed system, the peak amplitude of a pulse passing through the power limiter is directly proportional to the pressure of the gas in the limiter provided the pulse entering the limiter exceeds the critical value for that particular system, gas, and gas pressure. The device is passive and lossless, so that it can be used inside or outside the cavity. Experimental data on the operation of the power limiter using argon as the working substance are presented. (Author)

AD-463 425 Field 20K, 13M
CFSTI Prices: HC$1.00

Forest Products Lab., Madison, Wis.
BUCKLING COEFFICIENTS FOR FLAT, RECTANGULAR SANDWICH PANELS WITH CORRUGATED CORES UNDER EDGEWISE COMPRESSION.
Research paper,
by Paul M. Jenkinson and Edward W. Kuenzi.
May 65, 19p Rept. no. FPL-25
Contract AF33 615 65 5002

Unclassified report

This paper is another progress rept. in the series (Military Handbook 23 Work Group).

Descriptors: (*Buckling(Mechanics), Sandwich panels), (*Sandwich panels, Buckling(Mechanics)), Sandwich construction, Rectangular bodies, Sheets, Elasticity, Loading(Mechanics), Glass textiles, Laminated plastics, Stresses, Strain(Mechanics), Epoxy plastics, Polyester plastics, Equations, Compressive properties.

The report presents curves of coefficients and formulas for use in calculating the buckling of flat panels of sandwich construction with corrugated cores under edgewise compressive loads. The formulas apply to sandwich panels having: (1) one facing of orthotropic material, the other facing of an isotropic material; (2) both facings of orthotropic material; or (3) both facings of isotropic material. Parameters are chosen so that facings may be of different thicknesses and so that facings can also be of different isotropic or orthotropic materials. Equations are presented for various edge conditions, simply supported and clamped. Curves of buckling coefficients are presented for simply supported sandwich panels with both facings either isotropic or orthotropic. (Author)

AD-466 363 Field 20B
CFSTI Price: HC$2.00

RIAS, Inc., Baltimore, Md.
EMBRITTLEMENT OF SILVER CHLORIDE BY COPPER CHLOROCOMPLEXES.
Technical rept. no. 5,
by A. R. C. Westwood and D. L. Goldheim.
May 65, 28p Technical rept. no. 65-4 Unclassified report
Contract Nonr416200

Descriptors: (*Silver compounds, Chlorides), (*Brittleness, Silver compounds), (*Complex compounds, Copper compounds), Crystals, Fracture(Mechanics), Hydrochloric acid, Solutions, Ions, Failure(Mechanics), Mechanical properties, Deformation.

Previous studies have revealed that when polycrystalline AgCl is deformed in aqueous solutions containing silver complex-ions of charge greater than (2-) or (1+), the fracture mode changesfrom ductile and transcrystalline, as in air, to brittle and intercrystalline. In the present paper it is demonstrated that complexes not containing silver, viz. copper chlorocomplexes, also can induce brittle behavior in polycrystalline AgCl. Thus the phenomenon of complex-ion embrittlement may be more general than hitherto indicated. Observations on the variation in time to failure of statistically loaded specimens with applied stress and (i) concentration and type of copper chlorocomplexes present in the testing environment (ii) composition and temperature of the base environment (HCl or H2O) are described and discussed. (Author)

AGN-8141 Field 20M
CFSTI Prices: HC$3.00 MF$0.75

Aerojet-General Nucleonics, San Ramon, Calif.
ALKALI METALS EVALUATION PROGRAM -- THE DETERMINATION OF THE LATENT HEAT OF VAPORIZATION AND VAPOR PRESSURE OF POTASSIUM FROM 1000 TO 1900 DEGREE F,
by P. Y. Achener. Apr 65, 65p
Contract AT04 3 368

Unclassified report

Descriptors: (*Potassium, Thermodynamics), (*Heat of sublimation, Potassium), (*Vapor pressure, Potassium), High-temperature research.

BNL-8677 Field 20G, 9B
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
COMPUTER CALCULATIONS OF THE EFFECTIVE LENGTH OF AGS MAGNETS,
by P. F. Dahl and G. Parzen. 3 Dec 64, 5p
Contract AT30 2GEN16

Unclassified report

Descriptors: (*Alternating gradient focusing accelerators, Cyclotron magnets), (*Cyclotron magnets, Programming(Computers)).

BNL-8914 Field 20G
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
NETWORK REPRESENTATION OF PI/2 MODE ACCELERATING WAVEGUIDE SYSTEM.
Internal rept.,
by J. P. Blewett. 8 Feb 65, 7p AADD-65
Contract AT(30-2)-GEN-16

Unclassified report

Descriptors: (*Waveguides, Particle accelerator components), (*Particle accelerator components, Waveguides), Theory.

BNL-8935 Field 20H
CFSTI Prices: HC$2.00 MF$0.75

Brookhaven National Lab., Upton, N. Y.
THE PRESENT STATUS OF VERY HIGH ENERGY P-P, ANTI P-P, PI PLUS MINUS-P AND K PLUS MINUS-P SCATTERING,
by S. J. Lindenbaum. 22 Jan 65, 41p
CONF-650106-3
Contract AT30 2GEN16

Unclassified report

Prepared for presentation at Conference on Symmetry Principles at High Energy, Coral Gables, Fla.

Descriptors: (*Elementary particles, Scattering).

BNL-8937 Field 20G
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
PROPOSED REMOTE HANDLING METHODS FOR A MODIFIED AGS,
by C. R. Flatau. 1964, 10p CONF-650306-5
Contract AT30 2GEN16
Unclassified report

Prepared for presentation at Particle Accelerator Conference, Washington, D. C.

Descriptors: (*Alternating gradient focusing accelerators, Remote control systems).

BNL-8983 Field 20G, 20C
CFSTI Prices: HC$1.00 MF$0.50

Brookhaven National Lab., Upton, N. Y.
A REGULATED, PULSED CURRENT SYSTEM FOR FOCUSSING MAGNETS,
by R. A. Larson. 3 Mar 65, 9p CONF-650306-19
Contract AT30 2GEN16
Unclassified report

Prepared for presentation at Particle Accelerator Conference, Washington, D. C.

Descriptors: (*Particle accelerator components, Magnets), (*Magnets, Particle accelerator components).

CONF-550-96 Field 20H
CFSTI Prices: HC$1.00 MF$0.50

Michigan Univ., Ann Arbor.
MANY-CHANNEL RESONANCE THEORY,
by Marc Ross. 1964, 5p
Contract AT(11-1)-1112
Unclassified report

Prepared for presentation at International Conference on High-Energy Physics, Dubna, USSR, Aug 64.
Prepared in cooperation with Brookhaven National Lab., Upton, N. Y.

Descriptors: (*Nuclear resonance, Theory).

EURAEC-1320 Field 20B, 18J, 11B
CFSTI Prices: HC$1.00 MF$0.50

Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
PHYSICAL PROPERTIES OF UO 2 SINGLE CRYSTALS.
Quarterly rept. no. 11, 1 Jul-31 Oct 64,
31 Oct 64, 16p EUR-2304
Contract 056-64-3
Unclassified report

Descriptors: (*Single crystals, Uranium compounds), (*Uranium compounds, Dioxides).

N65-21459 Field 20L, 18H
CFSTI Prices: HC$1.00 MF$0.50

General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
RADIATION EFFECTS ON SILICON.
Quarterly progress rept., no. 2, 1 Sep-30 Nov 64,
by H. K. Lintz, D. P. Snowden, and V. A. J. van Lint.
14 Dec 64, 19p GACD-5974
Contract NAS7-289
NASA CR-62191
Unclassified report

Descriptors: (*Silicon, Radiation damage), (*Radiation damage, Silicon), Semiconductors.

N65-22617 Field 20I
CFSTI Prices: HC$4.00 MF$1.00

TRW Space Technology Labs., Redondo Beach, Calif.
INVESTIGATION OF ION BEAM DIAGNOSTICS.
Final rept.,
by J. M. Sellen, Jr. and Robert F. Kemp. 15 Apr 65,
138p STL-4137-6018-SU-000
Contract NAS3-4114
NASA CR-54147
Unclassified report

Descriptors: (*Ion beams, Plasma physics), (*Plasma medium, Wind tunnels).

N65-23210 Field 20B
CFSTI Prices: HC$1.00 MF$0.50

General Electric Co., Philadephia, Pa.
Missile and Space Div.
STUDY OF THE GROWTH PARAMETERS INVOLVED IN SYNTHESIZING BORON CARBIDE FILAMENTS.
Quarterly rept. no. 2,
by A. Gatti and C. Mancuso. Dec 64, 21p
Contract NASw937
NASA CR-62591
Unclassified report

Descriptors: (*Crystal growth, Single crystals), (*Boron compounds, Carbides), Filaments.

N65-23211 Field 20I, 20F
CFSTI Prices: HC$2.00 MF$0.50

Allison Div., General Motors Corp., Indianapolis, Ind.
SPECTROSCOPIC INVESTIGATIONS OF PLASMA PROPERTIES.
Quarterly summary rept. no. 2, 11 Aug-10 Nov 64,
by R. T. Schneider and F. G. Myers. 9 Dec 64, 36p
Rept. no. 4038
Contract NASw-922
NASA CR-62588
Unclassified report

Descriptors: (*Plasma medium, Spectroscopy), (*Spectroscopy, Plasma medium).

Patent 3,202,817 Field 20G

POLYENERGETIC PARTICLE DEFLECTING SYSTEM.
Patent assigned to AEC,
by Roger L. Belbeoch. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Particle beams, Deflection), (*Linear accelerators, Charged particles), Electrons, Electrostatic fields, Magnetic fields.

The polyenergetic particle deflecting system is for use in a linear accelerator. A beam deflection method is for deflecting a beam of particles of different energy of momentum while conserving the beam properties of parallelism, beam diameter, and longitudinal bunching.

Patent 3,202,870 Field 20F, 15B

AUTOMATIC GLOWER SUPPLY.
Patent assigned to Army,
by Hugh R. Carlon. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Infrared radiation, Heaters), (*Infrared equipment, Starting), Automatic, Infrared detectors, Relays, Electric switches, Air pollution, Contamination, Temperature, Circuits, Nerve agents, Patents.

The device is for starting and maintaining a glower (source of radiation for infrared instruments) at its operating temperature. The circuit includes a voltage-sensitive relay having a control switch in parallel to the glower. The control switch is in series with the electric heater whereby electrical energy is directed to the heater only when the glower is below a certain temperature. The circuit is used with commercial spectrometers. It finds its greatest use in the long path infrared detection of atmospheric contaminants. (Author)

Patent 3,208,009 Field 20E

LASER WITH YTTERBIUM ACTIVATED GLASS SENSITIVE ELEMENT.
Patent assigned to Navy,
by Howard W. Etzel, Harold W. Gandy, and Robert J. Ginther. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Lasers, Optical glass), (*Optical glass, Ytterbium), Patents, Pumping(Electronics), Infrared radiation, Ions.

The laser has a solid luminescent sensitive element of optional regenerative configuration. It consists essentially of a clear glass activated with trivalent ytterbium ions to absorb optical pumping energy in the near infrared region at wavelengths of from 914 to 974 mu and exhibit stimulated emission of radiation in the near infrared region in a waveband of 6 mu width which has its optical center at 1.015 microns.

Patent 3,208,068 Field 20I, 9E, 16A, 22B

EXCITATION OF A SURFACE WAVE ON A THIN PLASMA SHEATH SURROUNDING A MISSILE.
Patent assigned to Navy,
by John G. Hoffman. 21 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Guided missiles, Plasma sheath), (*Plasma sheath, Atmosphere entry), (*Waveguide couplers, Plasma sheath), Reentry vehicles, Microwaves, Patents.

An arrangement is disclosed for coupling a waveguide to a plasma sheath, that is, ionized atmospheric layer, upon which is developed an electromagnetic wave. The plasma slab or sheath is an ionized atmospheric layer in proximity of a hypersonic vehicle or antenna either man made or caused by a re-entry of a vehicle from space into the atmosphere at high speeds. It is this ionized layer that causes a period of communications blackout during re-entry.

PB-168 474 Field 20M, 18J
CFSTI Prices: HC$3.00 MF$0.75

Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
VAPOUR PRESSURE STUDIES OF URANIUM DIOXIDE UO2 BY THE EFFUSION METHOD. (Mesure de la Tension de Vapeur du Bioxyde d'Uranium UO2 par la Methode d'Effusion),
by Roland W. Ohse. Sep 65, 69p
Rept. no. CEA-R-2871
Unclassified report

Text in French, summary in English.

Descriptors: (*Vapor pressure, Uranium compounds), (*Uranium compounds, Dioxides), Diffusion, Reactor fuels, Thermodynamics, Molecular beams, High-temperature research, France.

A high temperature apparatus for vapour pressure measurements by KNUDSEN effusion method is described. Sample is heated in a tungsten cell in an electronic bombardment furnace. Several critical factors affecting the accuracy of measurements such as: temperature distribution and measurement in the effusion cell, CLAUSING factor and molecular flow, compatibility between cell material and sample heated, are discussed with careful attention. Vapour-pressure of UO2 has been studied between 2200 and 2800 K. (Author)

TID-21826 Field 20H
CFSTI Prices: HC$1.00 MF$0.50

Michigan Univ., Ann Arbor.
THE PRECISION ENERGY MEASUREMENTS OF GAMMA RAYS IN THE ENERGY REGION OF 90-2500 KEV,
by J. J. Reidy. 1964, 12p
Contract AT(11-1)-1112
Unclassified report

Descriptors: (*Gamma rays, Measurement).

TID-21852 Field 20B, 20F
CFSTI Prices: HC$1.00 MF$0.50

Virginia Inst. for Scientific Research, Richmond.
EFFORTS TO GROW VERY LARGE BERYLLIUM SINGLE CRYSTALS FOR NEUTRON SPECTROMETERS.
Final rept.,
by James F. Kirn. 16 Feb 65, 20p
Contract AT(40-1)-2860
Unclassified report

Descriptors: (*Beryllium, Single crystals), (*Single crystals, Spectrum analyzers), (*Crystal growth, Single crystals).

UCRL-7497 Field 20E, 20J
CFSTI Prices: HC$2.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
THEORY OF COUPLED-MODE LASER OSCILLATIONS,
by J. A. Fleck, Jr. and R. E. Kidder. 8 Apr 64, 33p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Lasers, Oscillation), (*Quantum mechanics, Lasers).

UCRL-7826 Field 20H
CFSTI Prices: HC$1.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Livermore.
PRODUCTION OF 44-A CARBON X RAYS BY 15- TO 110-KEV PROTONS,
by J. M. Khan, D. L. Potter, and R. D. Worley.
27 Apr 64, 19p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Gamma-proton reactions, X rays), (*X rays, Proton bombardment).

UCRL-11001 Field 20L
CFSTI Prices: HC$3.00 MF$0.75

Lawrence Radiation Lab., Univ. of California, Berkeley.
KINETICS OF THE ANATASE RUTILE TRANSFORMATION,
by Robert D. Shannon and Joseph A. Pask.
30 Apr 64, 54p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Rutile, Transformations).

UCRL-11333 Field 20H
CFSTI Prices: HC$1.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Berkeley.
A MEASUREMENT OF FORWARD DIFFERENTIAL CROSS SECTION FOR THE REACTION PI(-) + P TO PI(0) + N AT 900 MEV IN THE 72-INCH HYDROGEN BUBBLE CHAMBER,
by Alan Natapoff and Vo Xuen Bang. 13 Mar 64, 17p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Differential cross section, Meson reactions), (*Meson reactions, Bubble chambers).

UCRL-11783 Field 20G, 9A
CFSTI Prices: HC$1.00 MF$0.50

Lawrence Radiation Lab., Univ. of California, Berkeley.
A 600-KV, 10-MA DC COCKCROFT-WALTON RECTIFIER USING SILICON DIODES AT 100 KC,
by Louis L. Reginato and Bob H. Smith. 2 Mar 65, 16p
CONF-650306-46
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Diodes(Semiconductors), Power supplies), (*Power supplies, Particle accelerators), Rectifiers.

UCRL-12207 Field 20H, 20I
CFSTI Prices: HC$3.00 MF$0.75

Lawrence Radiation Lab., Univ. of California, Livermore.
DISPERSION RELATION FOR RELATIVISTIC STREAMS OF FINITE RADIUS,
by Ronald W. Landau. 4 Jan 65, 82p
Contract W-7405-eng-48
Unclassified report

Descriptors: (*Plasma oscillations, Stability), (*Particle beams, Plasma medium).

## 21. Propulsion and Fuels

CONF-640810-1 Field 21F
CFSTI Prices: HC$2.00 MF$0.50

General Electric Co., Cincinnati, Ohio. Nuclear Materials and Propulsion Operation.
THE 630A HIGH PERFORMANCE MERCHANT SHIP NUCLEAR STEAM GENERATOR,
by R. E. Wood. 1964, 43p TM-64-8-14
Contract AT(40-1)-2847 Unclassified report
Presented at Conference on Nuclear Marine Propulsion, Blacksburg, Va., 10-13 Aug 1964.

Descriptors: (*Marine nuclear propulsion, Merchant vessels).

N65-22563 Field 21I, 7B
CFSTI Prices: HC$3.00 MF$0.50

Martin Co., Denver, Colo.
STUDY OF CONTAMINATION OF LIQUID OXYGEN BY GASEOUS NITROGEN.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 65,
by Dale A. Fester, Philip J. Pizzolato, and John R. Wilde. Apr 65, 52p
Contract NAS8 11337
NASA CR-62382, CR 64-51
Unclassified report

Descriptors: (*Oxygen, Contamination), (*Rocket propellants, Oxygen), (*Nitrogen, Contamination), Programming(Computers), Liquified gases.

Patent 3,201,937 Field 21E, 16D

VARIABLE AREA ORIFICE INJECTOR.
Patent assigned to Navy,
by Richard D. McKee. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Orifices, Injectors), (*Injectors, Exhaust nozzles), Guided missile components, Thrust, Jet propulsion, Actuators, Patents.

The injector is part of a jet propulsion apparatus. It is used for controlling the direction of thrust produced by a nozzle to thereby control the direction of movement of a rocket propelled missile. The nozzle is a converging-diverging De Laval type. The nozzle is provided with four angularly spaced discharge orifices. These orifices are of variable area, suitable valving apparatus being disposed directly adjacent the point of fluid discharge rather than remotely as in the prior art.

Patent 3,201,973 Field 21H, 21B

SOLID PROPELLANT BURNING RATE DETECTOR.
Patent assigned to Navy,
by John E. Fitzgerald and Norman C. Allen. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Rocket motors(Solid propellant), Burning rate), (*Burning rate, Rocket motors(Solid propellant)), Instrumentation, Patents, Solid rocket propellants.

The instrument measures accurately the burning rate of solid propellant rocket motors. This is accomplished by use of light-transmitting rods of different lengths embedded in a propellant grain and transmitting light energy during burning of the grain to light-sensitive elements which generate signals indicative of the rate of grain burning.

Patent 3,202,381 Field 21H

RECOVERABLE ROCKET VEHICLE.
Patent assigned to NASA,
by Hans F. Wuenscher. 24 Aug 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Recoverable booster motors, Design), Rocket motors(Solid propellant), Cylindrical bodies, Patents, Staging.

Each stage of the rocket vehicle is formed of a plurality of interfitting sections, each section of which is capable, in itself, of guided return to a given, predetermined station. The sections when mated maintain a cylindrical configuration. The tank or compartment arrangement involves longitudinally divided interfitting walls or bulkheads.

Patent 3,202,557 Field 21I, 19A

BURN INHIBITOR FOR FLUOROCARBON BOUND PROPELLANTS.
Patent assigned to Navy,
by Martin H. Kaufman. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Propellant grains, Inhibition), (*Halocarbon plastics, Propellant grains), Ketones, Solutions, Aging(Materials), Amines, Tapes, Acetates, Igniters, Flares, Propellants, Solid rocket propellant binders, Patents.

The burn inhibitor paste is for fluorocarbon-containing propellant grains used in cartridge-loaded igniters and flares. The paste contains a ketone or ethyl acetate solution of the copolymer of vinylidene fluoride and perfluoropropylene and a curing agent. The agent may be tetramethylene tetramine or hexamethylene tetramine.

Patent 3,202,582 Field 21F, 21H, 22B

GASEOUS NUCLEAR ROCKET.
Patent assigned to NASA,
by Frank E. Rom. 24 Aug 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Spacecraft nuclear propulsion, Rocket motors), (*Nuclear propulsion, Rocket motors), (*Rocket motors, Nuclear propulsion), Patents, Rockets.

The nuclear rocket for extraterrestrial flight is in the form of a gaseous nuclear reactor. One or more streams of a working fluid are introduced concentrically adjacent to a gaseous fissile material in a heating chamber or cell. Introduction of a working fluid in this manner permits transfer of heat by radiation from the fissioning gaseous material and reduces mixing of the working fluid with the gaseous fissioning stream to a minimal, thereby increasing fissile material residence time relative to the working fluid.

Patent 3,204,405 Field 21H

THREE DIMENSIONAL JET VECTORING SYSTEM.
Patent assigned to Army,
by Raymond W. Warren and Ronald E. Bowles.
7 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Thrust vector control systems, Rocket propulsion), (*Rocket engines, Thrust vector control systems), Guided missiles, Rockets, Gas flow, Jets, Three-dimensional flow, Deflection, Patents, Coanda effect.

The fluid control system is for controlling the flight of missiles, rockets and reaction propelled vehicles. The three-stage system employs only cool gas during the valving stage, uses this cool gas to deflect a hot gas stream during the second stage, and thereafter uses the controlled hot gas stream of the second stage to deflect the hot gases produced by the main propelling jet of the rocket motor.

Patent 3,205,286 Field 21I, 13H

SMOKELESS POWDER MANUFACTURE.
Patent assigned to Army,
by Donald H. Black. 7 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Smokeless propellants, Manufacturing methods), (*Powders, Smokeless propellants), (*Solid rocket propellants, Manufacturing methods), Patents, Containers, Solid rocket propellant plasticizers, Pressure.

The smokeless powder propellants are suitable for propelling military rockets and actuating jet devices such as assisted takeoff motors for airplanes. Smokeless powder granules are introduced into a container, pressure is placed on the granules and nonvolatile plasticizers are admitted to the container through the lower portion.

Patent 3,205,658 Field 21H

FUEL BURNER WITH FLAME HOLDER.
Patent assigned to Air Force,
by Aldo B. Vanoni. 14 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Combustion chambers, Bipropellants), (*Flame holders, Combustion chambers), Conical bodies, Fuel injectors, Oxidizers, Patents.

The bi-propellant combustion chamber is cone-shaped and has a central oxidizer and surrounding fuel injection elements in its small end and a combustion discharge tube in its larger end. There is a conical flame holder baffle in the smaller end for maintaining the flame in the combustion chamber downstream therefrom in the center of the combustion chamber surrounded by fuel in contact with the inner wall of the combustion chamber for controlling the rise in the temperature of the wall of the combustion chamber during operation.

Patent 3,207,075 Field 21H

OUT-OF-LINE ROCKET IGNITER.
Patent assigned to Navy,
by Robert H. Semenoff. 21 Sep 65

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Rocket igniters, Rocket motors-(Solid propellant)), Safety devices, Explosive initiators, Primers.

The igniter is for a solid propellant rocket motor and includes a mechanical safety feature in addition to a novel form of electrical safety device. A motor driven squib cylinder for the rocket igniter may be rotated from an in-line to an out-of-line position with respect to the primer element.

## 22. Space Technology

N65-20162 Field 22B
CFSTI Prices: HC$1.00

National Aeronautics and Space Administration, Washington, D. C.
X-15 RESEARCH RESULTS WITH A SELECTED BIBLIOGRAPHY,
by Wendell H. Stillwell. 1965, 135p
NASA SP-60
Unclassified report

GPO HC$0.55.

Descriptors: (*Research planes, Astronautics).

N65-21719 Field 22A
CFSTI Prices: HC$2.00 MF$0.75

Midwest Research Inst., Kansas City, Mo.
STUDY FOR THE INDICIAL LOAD EFFECTS ON MULTI-STAGE SPACE VEHICLE SYSTEMS. VOLUME III: A DESCRIPTION OF THE COMPUTER PROGRAM EMPLOYED.
Annual summary rept. 21 Jun 63-20 Aug 64,
by Duncan Sommerville and Robert R. Blackburn.
9 Oct 64, 61p
Contract NAS8 11012, Proj. 2715-P
NASA CR-622001
Unclassified report

Descriptors: (*Aerodynamic loading, Guided missiles), (*Programming(Computers), Aerodynamic loading).

Patent 3,204,447 Field 22C, 1A, 20M

ENTHALPY AND STAGNATION TEMPERATURE DETERMINATION OF A HIGH TEMPERATURE LAMINAR FLOW GAS STREAM.
Patent assigned to NASA,
by Lloyd N. Krause, George E. Glawe, and Robert C. Johnson. 7 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Reentry vehicles, Aerodynamic heating), (*Atmosphere entry, Thermodynamics), (*Laminar flow, Aerodynamic heating), Enthalpy, Stagnation point, High-temperature research, Determination, Patents, Thermal conductivity.

The method is used to measure temperatures simulating the conditions surrounding a space vehicle during reentry into the atmosphere. A cylindrical heat conductive body of known thermal conductivity terminating at least at oneend with a spherical surface is axially aligned in a high temperature gas stream parallel to the laminar flow path with the surface facing upstream. The body is continually cooled and heat flow is attained through the body; the temperature is then measured at two differently longitudinally spaced points along the body. The actual heat flow through the body is then easily calculated.

Patent 3,204,889 Field 22B, 10B

SPACE VEHICLE ELECTRICAL SYSTEM.
Patent assigned to NASA,
by Robert J. Schwinghamer. 7 Sept 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Spacecraft, Electric power production), (*Electric power production, Spacecraft), Space propulsion, Electromagnetic pulses, Radar equipment, Lasers, Solar cells, Capacitors, Patents.

The power source-power propulsion system is designed to propel a space vehicle on a self sustaining basis over an extended period. The high voltage source permits operation of electro-magnetic tooling, the use of laser in communication and of pulse radar. Solar cells are used. The outer skin and other structural members are separated by dielectric materials in such a way as to form a plurality of capacitors.

Patent 3,206,141 Field 22B

SPACE VEHICLE ATTITUDE CONTROL.
Patent assigned to NASA,
by Howard C. Vivian and James D. Acord. 14 Sep 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Spacecraft, Attitude control systems), (*Attitude control systems, Spacecraft), Patents.

The system is for controlling the attitude of a space vehicle about three orthogonal axes. The system includes a sun sensor and an earth sensor which generate signals indicative of the direction of deviation of the vehicle from a predetermined attitude. Three gyroscopes are used to orient the vehicle in any arbitrary direction with respect to the Sun and Earth reference directions for short periods of time.

Patent 3,206,775 Field 22B

COMBINATION BED, CHAIR, DESK AND LOUNGE STRUCTURE FOR SPACE VEHICLES.
Patent assigned to Air Force,
by George W. Filson. 21 Sept 65
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.50

Descriptors: (*Spacecraft seats, Design), Spacecraft, Bedding, Nylon, Patents.

The structure is supported on four depending legs which are attached to the floor of the space vehicle. It includes a seat support frame, a back support frame, a desk structure and supports for the legs. All of the parts are adjustable. Preferably, a nylon netting is used for covering the back and seat portions.

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